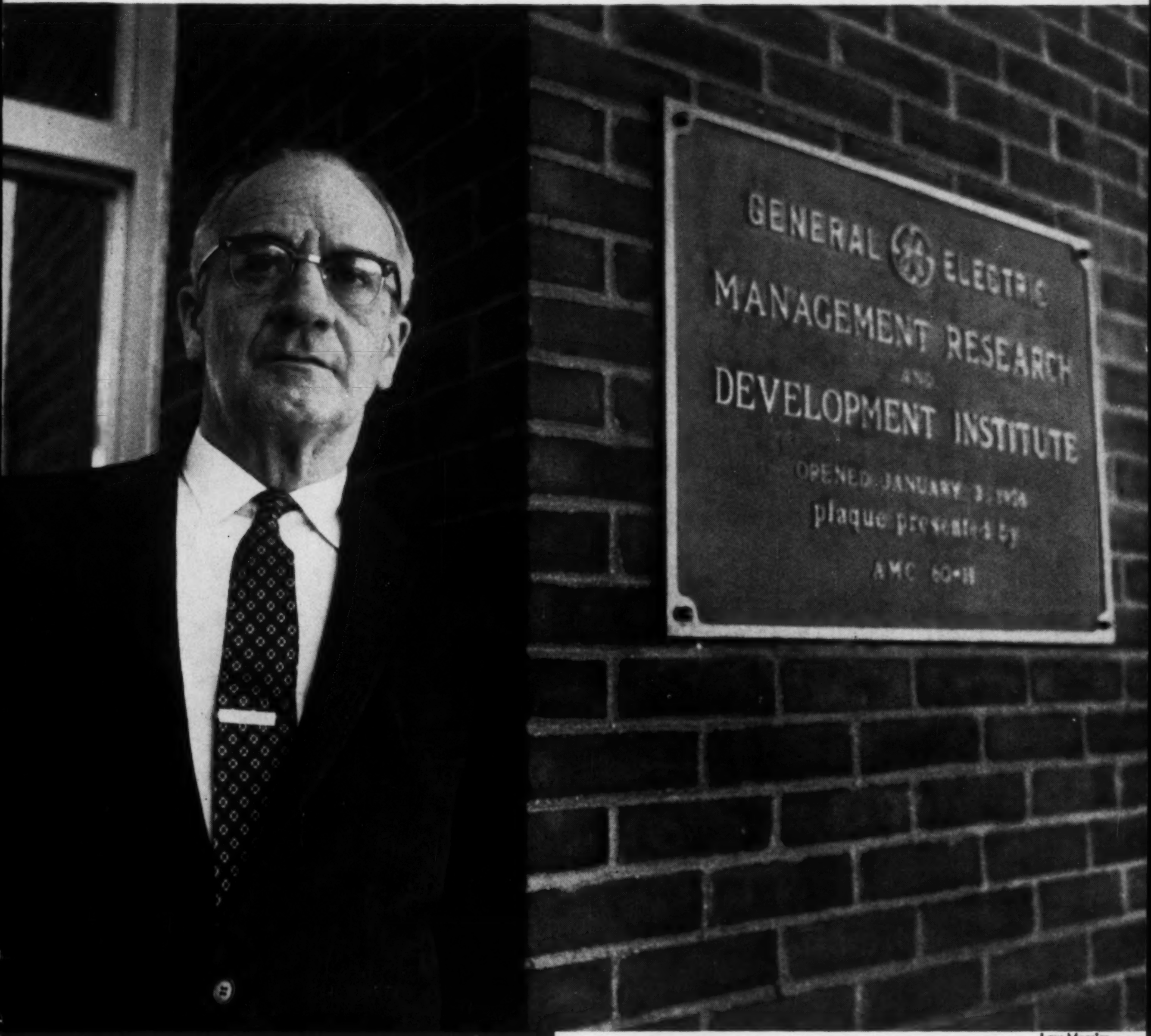
IRON AGE

THE NATIONAL METALWORKING WEEKLY A Chilton Publication MARCH 2, 1961


GENERAL ELECTRIC
MANAGEMENT RESEARCH AND DEVELOPMENT INSTITUTE
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AMC 60-11

Lew Merrim

★ GE's Moorhead Wright Discusses:

A Program for Executive Self-Development p. 71

Are Steel Imports Faltering? p. 59

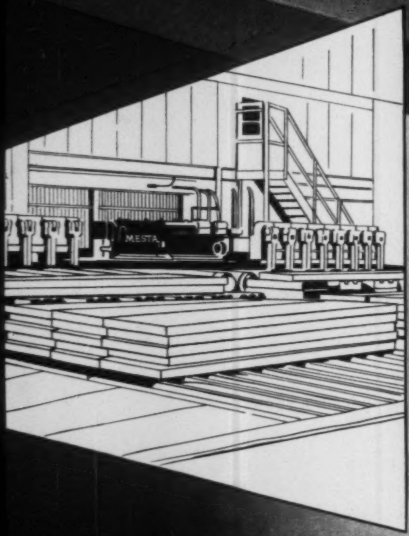
Materials for Space Power Plants p. 87

Digest of the Week p. 2-3

SLABBING MILLS

Designed and Built by
MESTA

Rolling 20 Ton Ingots into Slabs on a Mesta
45" x 90" Universal Reversing Slabbing Mill



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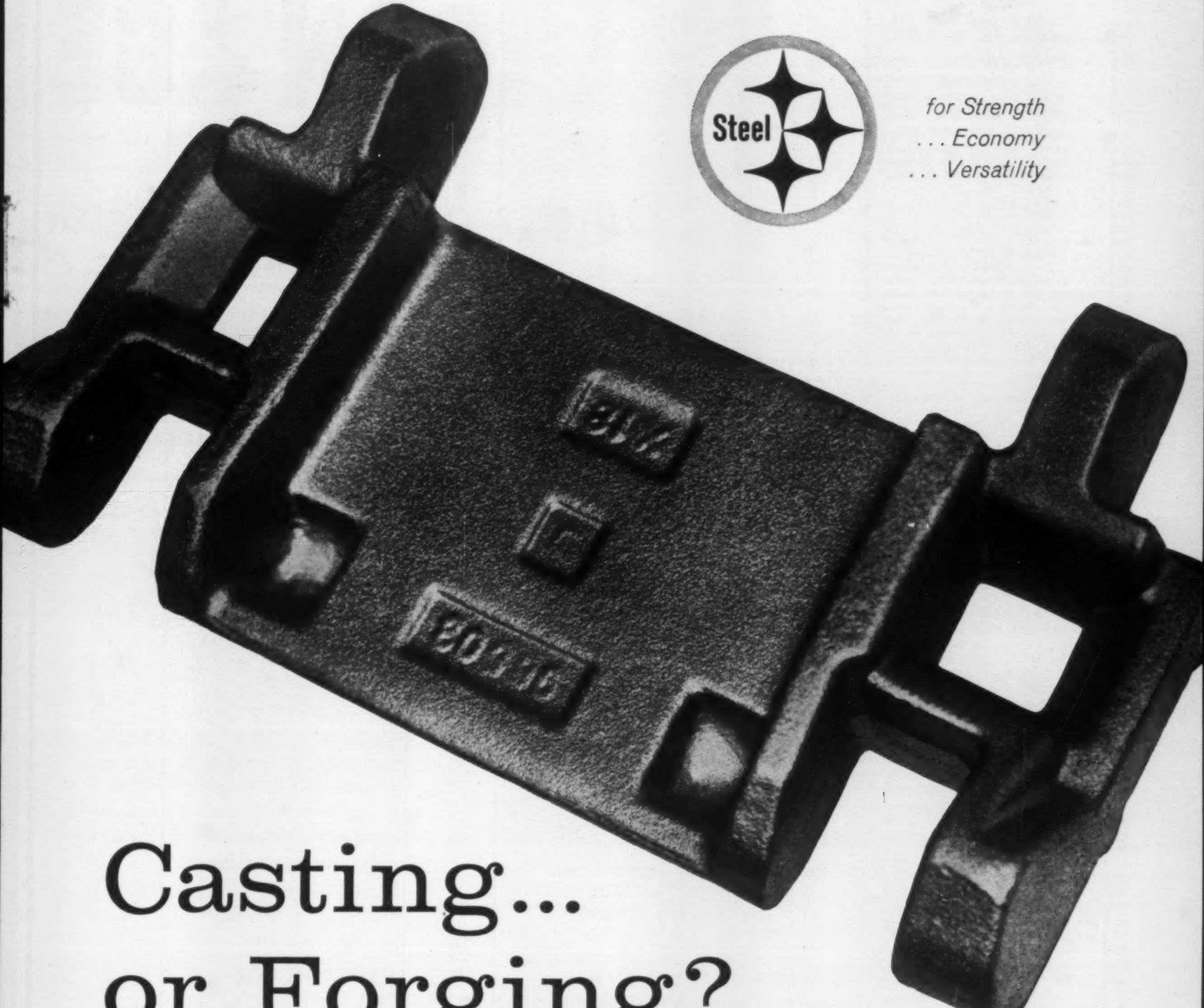

Casting... or Forging?

From the look of it, most people would probably guess casting. But it's a forging. Which proves a point. Many parts *look* too complicated for forging, but actually aren't. By careful selection of parting line, close trimming, and punch-outs, we're often able to forge parts you'd never expect to obtain as forgings. If you have such a part (and would welcome the strength and economy of forgings), send us a finished print. We'll be glad to study it and tell you frankly whether or not we can forge it. If we can, you can count on us for fast delivery.

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THE IRON AGE, published every Thursday by CHILTON COMPANY, Chestnut & 56th Sts., Philadelphia 39, Pa. Second class postage paid at Philadelphia, Pa. Price to the metalworking industries only or to people actively engaged therein. $2 for 1 year. $3 for 2 years in the United States, its territories and Canada. All others $15 for 1 year; other Western Hemisphere countries, $25; other Foreign Countries, $35 per year. Single copies 50¢. Annual Review Issue $2.00. Cable: "Chilton," Philadelphia

The IRON AGE

March 2, 1961—Vol. 187, No. 9

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Buyers Won't Wait—Steel users, pressing for fast delivery, are bypassing imports for steel from domestic mills. Other disadvantages of foreign-made products are also aiding U. S. steelmakers. P. 59

LEAD OUTLOOK

New Markets Ahead—Producers differ on degree, but all agree a brighter era lies ahead for lead. Two new markets help spur the optimism: Sound and vibration control, and nuclear shielding. P. 62

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Bright Future—Automakers are

Metalworking

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planning on using more bright annealed stainless steel in cars this year. With this in mind, more and more steel companies are entering the market. P. 75

MACHINE TOOLS

Automatic Assembly — The idea of machine assembly hasn't been abandoned completely. And a new approach as to where and how to use it in metalworking might be worthwhile. P. 79

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New Energy Sources — Materials needs for the '60s will be greatly influenced by growing demands for energy of all types. Problems of temperature extremes, irradiation, corrosion and weight must be tamed. Each new energy source has its own particular advantages. P. 87

SHRINK-FITTING UNIT

Assembles Rotors — An automated shrink-fitting and post-heating machine simplifies rotor production. Bent shafts and undesirable eddy currents have been reduced to a negligible factor. These rotors serve in small induction motors for home appliances. P. 90

CEMENTED CARBIDE

Boasts Versatility—A new heat-treatable carbide consists of 45 pct titanium carbide by volume, bonded with a chrom-moly alloy steel. This newcomer has steel's heat treating and forming traits. It also boasts carbide's wear resistance. P. 92

MECHANICAL ROBOT

Handles Forging Job—More than 200 distinct movements can be programmed into a robot that duplicates the functions of a human arm. A mechanical brain remembers commands and drives arm. P. 96

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WEST COAST

Building Boom—A recent study predicts record outlays of at least $7 billion for construction in California this year. That's $309 million more than last year. P. 77

STEEL SUMMARY

Edging Upward—Seasonal effects and end of inventory control are picking up the steel market. The improvement is relative—only up to the level of last October—but it's encouraging. P. 129

PURCHASING

More Gear Interest — There are more inquiries coming from buyers interested in industrial gears. This, say manufacturers, could lengthen deliveries. P. 130

NEXT WEEK

HEAT-TREATED PLATES

A New Market—Steel mills may set new guide posts for product development as they take the wraps off heat-treated plates. Next week's report pinpoints how the steel mills are using big, modern lines for continuous heat treating.

How's this for high-speed hobbing?

WORK PIECE					HOB (1 start)								
Dia. Pitch	No. of Teeth	Helix Angle	Face Width	Material	Dia.	RPM	Feet PM	Feed	Pieces per Load	Method*	Time per Piece	Pieces per Grind	Cut
10	20	15°	1¾"	1040 leaded	3"	500	395	.055"	1	A	2 min. 25 sec.	150	Finish
7	23	13°	¾"	8620	4"	350	370	.100"	2	A and B	59 sec.	240	Pre-shave
5	43	24°	1⅝"	8620	4"	280	300	.100"	2	B	3 min. 45 sec.	80	Pre-shave

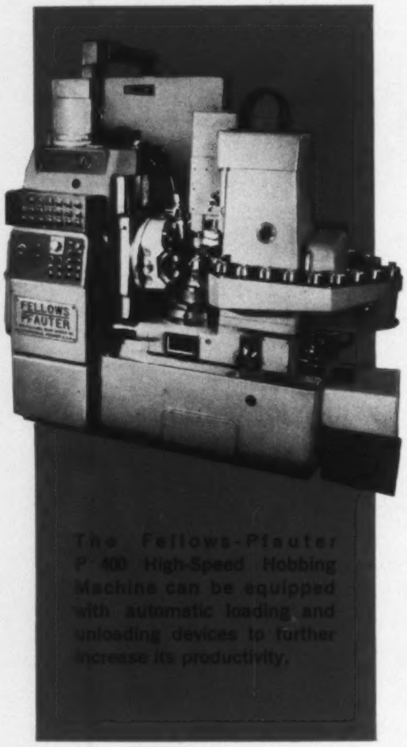
** Method A: Diagonal Hobbing. Method B: Step-by-step Hobbing.*

The chart shows the cost-cutting, high-production performance you get with the Fellows-Pfauter P 400 High-Speed Hobbing Machine. And here are some advanced design features that make it possible:

It's Easy & Fast to Handle. Work area is easily accessible for setup and loading • Automatic retraction of table from hob facilitates work changes • Pushbutton hob shifting • Built-in hydraulics for operation of tailstock and fixtures • Provides infinitely variable speeds and feeds.

It's Rigid and Rugged for High Production. Heavy, rugged hob head • Double wall construction column and bed, with heavy V-ways • Table as large as maximum work piece diameter • Index worm gear nearly as large as work table • Work support column of massive construction.

Saves time, floor space and production costs. Get complete details on the Fellows-Pfauter P 400 High-Speed Hobbing Machine.



The Fellows-Pfauter P 400 High-Speed Hobbing Machine can be equipped with automatic loading and unloading devices to further increase its productivity.

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Gear Production Equipment

The Business Outlook: Don't You Be an Ostrich!

There is a lot of beating of the breasts about whether we are in a recession. President Kennedy is blamed for putting it on too thick. Secretary of Labor Arthur J. Goldberg has been bawled out privately—by businessmen of course—for talking too much recession.

While this high-level argument over words and stances goes on, the lower-down-the-scale man pays no attention to it. If he is out of work he knows there is a depression, not a recession. If his car payments are due and he has no dough, he knows he is in trouble. So does the bank.

If thousands are laid off in places where such layoffs haven't been seen since the late thirties, they don't need Mr. Kennedy or any businessman to tell them what the pitch is. What they want to know is only one thing: "When do we work again?"

Business conditions are in the making, either on the up-side or the down-side, before any average person—or even above-average person—knows it.

All the talk in the world today, one way or the other, won't change the course of business too much in the next several months.

The bluntness of Mr. Kennedy and the dramatics of Mr. Goldberg may scare a lot of businessmen and many consumers. But in the end, they will do what they were going to do before they heard either gentleman.

There is a recession. It started at least as early as last May. It was mild at first. Now it is getting worse. It always gets worse before it gets better. Those who were asleep are now doing what they should have done many months ago.

This recession, like others, will pass. But it will take some time, some heartaches, a lot of Government mistakes, and some serious and agonizing reappraisals by many.

Some of the things the Administration will do may hold up recovery. Others will require from 9 to 18 months to take hold. This "thing" may be worse than even Mr. Kennedy says it is.

Each correction period calls for basic changes in our way of doing things. If these changes are not made, we are in for more trouble. These things must be faced.

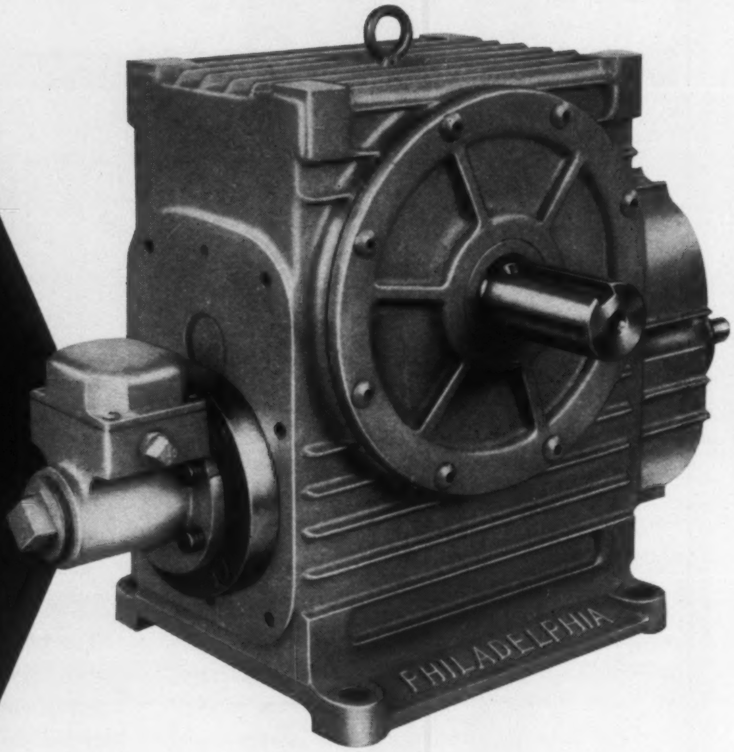
Don't be an ostrich!

Tom Campbell

Editor-in-Chief

INSIDE!

AN AUTOMATIC SWITCH FOR FAST, SURE PROTECTION AGAINST OVERLOAD

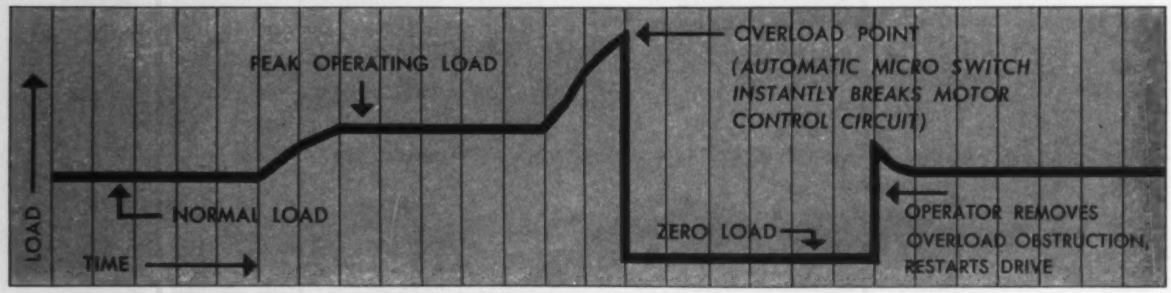


Here is instant protection against overload damage . . . Philadelphia Gear's Torque Control for worm gear reducers. When output torque of the reducer exceeds a pre-set value, the control breaks the motor control circuit—instantly. This is accomplished by mechanical actuation of an electrical line break switch. Truly foolproof protection for driving and driven equipment.

Time saved with Torque Control can be considerable, too. For example, you can remove the cause of overload or jam immediately. There is no waiting for heaters to function or for shear pin replacement. In short, downtime is either drastically cut or eliminated.

How about starting surge? Here, too, is an advantage . . . the control can be by-passed by holding the START push button to permit this temporary overload. Torque Control is optional on Phillie Gear equipment, and is available for either one direction of operation or both.

For information on our complete line of Worm Gear Reducers, write for catalog WG-60.



philadelphia gear drives

PHILADELPHIA GEAR CORPORATION
King of Prussia (Suburban Philadelphia), Pennsylvania

What's Behind the "Better Feeling?"

It's too early to draw a conclusion, particularly after so many false starts in the past six months. But seasonal factors may be taking hold and could mean a moderate business improvement.

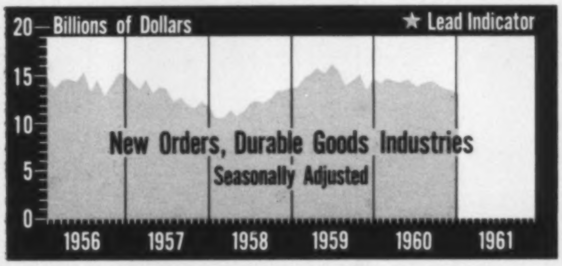
This has been noted in some better steel orders last week with medium and small-size users coming in for orders. Low inventories are generally pointed to as the cause and the moderate pickup can hardly be called a trend as yet. This pattern in steel has also been noted in diverse metalworking businesses.

Seasonal or not, attention is now focused on April as the critical month. Many economists say that if the economy does not get a lift by the end of next month, it will mean bad news for the period ahead.

Best guess now: The current "better feeling" is an aftermath of the frigid January and February. Many orders, held up then, are now being released.

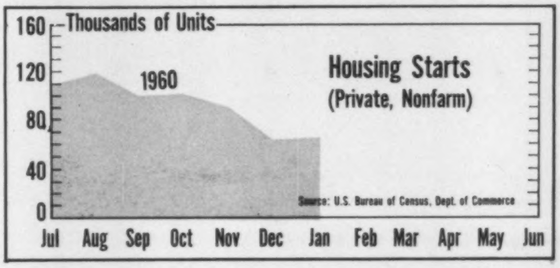
Durable Goods Orders Drop

If there is a "better feeling" in new orders, it doesn't show up in the statistics. Dept. of Commerce figures indicate new orders, particularly in the important durable goods industries, continue to fall off, but at a slightly slower rate. New orders for durable goods industries totaled $13.1 billion in January, down 2 pct from the previous month. Backlogs of unfilled orders dwindled, however, as shipments were slightly ahead of orders. Declines in both sales and orders were due largely to the lethargic auto industry.



Housing Starts Edge Up

Home building for 1961 has started out at a noncommittal rate. Seasonally adjusted, January housing starts (private, non-farm) come out at an annual rate of 1.07 million. This isn't good enough to be encouraging, but at least it's better than the dismal end of 1960. Total starts of 67,900 also came in spite of the worst winter weather in years, which may be a hopeful factor in the construction picture. Particularly in the heavily populated East, weather during the month would have discouraged much home building. For comparison, January starts were up 10 pct from December. But they lagged 17 pct below the January, 1960, rate.



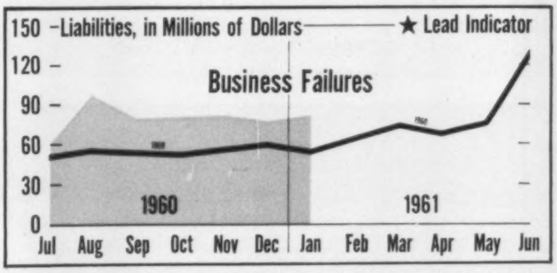
Source: U.S. Bureau of Census, Dept. of Commerce

Stainless Counts on Rapid Growth

There have been some rumblings that stainless steel has lost some of its luster as a growth industry. Not so, producers say. They are still bullish as ever about long-term prospects. One mill contends stainless tonnage will double in the next 10 years. A number of insiders say the metal could be on allocation by 1962. Basis of optimism: Stronger positions in auto and home markets. Current problems are due to the general recession, not loss of markets, producers maintain.

Business Mortality Rate High

Business failures, in both number and liability, increased in January. Total number of failures, at 1404, is the highest for any month in 1960 or 1959, according to Dun & Bradstreet. Liabilities of $81.5 million were well below the high of $126 million set last June. The big factor in the increase in failures was a higher toll in retail establishments. One note: For the month twice as many machinery and electrical goods wholesalers failed compared with January of 1960, probably a reflection of low capital spending.



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Gardner BGR disc specification

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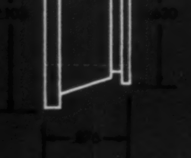
- deep grain penetration
- effective chip clearance

Gardner BKGR disc specification

- fast stock removal
- cool cutting
- effective chip clearance



Bearing Cone

Call the Gardner Abrasives Specialist for practical solutions to your disc grinding problems.

GARDNER

abrasive discs

BELOIT, WISCONSIN

FEIU: Air Dispute Still Not Settled

The Administration has left little doubt that it does not intend to let "little" squabbles in the transportation industry tie up the nation.

Goldberg: Land, sea and air.

Return to work by striking members of the Flight Engineers International Union last week was achieved in much the same manner as the strike of tugboat and ferry crewmen that tied up rail and water transportation into New York City.

Secretary of Labor Arthur J. Goldberg played a big role in each. The Flight Engineers at six of the seven airlines agreed to return pending the findings of a three-man commission appointed by President Kennedy earlier in the week.

Mr. Goldberg said it provides **"the status quo before the strike will be maintained and guaranteed."**

The strike was in protest to a ruling of the National Mediation Board. The board said flight engineers and pilots of United Airlines Inc., should vote together to determine whether they would be represented by the Air Line Pilots Assn. or the Flight Engineers International. Pilots outnumber engineers, who feared an end of their union.

However, as in the rail settlement, nothing has actually been solved—just postponed. But at least businesses and the public are no longer being inconvenienced by what are essentially internal industry disputes. Mr. Goldberg has said he will stay out of labor disputes which are essentially economic contract negotiations.

GE-IUE: Both Charged With NLRB Violations

National Labor Relations Board has authorized issuance of complaints against both General Electric Co. and the International Union of Electrical Workers for alleged violations growing out of the negotiations and strike last fall.

GE is being charge with failing to bargain in good faith. The IUE will be charged with responsibility for picket line violence.

USAW: High Jobless Rate Cuts SUB Pay

Many unemployed steelworkers will get a cut in unemployment pay as a number of major steel companies announce reductions in supplementary unemployment benefits.

SUB payments are designed to provide laid-off steelworkers with as much as 65 pct of their regular take-home pay.

However, whenever the funds fall below prescribed levels, the benefits are reduced. Unemployed workers may receive payments for up to 52 weeks—if the funds last that long.

Only a few of the major steel companies are still paying benefits at the rate of 100 pct. At least one is only paying 30 pct. U. S. Steel Corp. paid 100 pct in November, has cut back each month since. It paid only 52.5 pct in February.

AFL-CIO: On the Decline?

Is the "obituary" being written for labor unions?

This question was reportedly raised last week by AFL-CIO organization director John Livingston. In a closed-door session at the labor organizations winter meeting in Miami, he told union leaders that their unions are failing to enlist more workers.

He is said to have pointed out to the labor chiefs that five years ago unions had organized 40 pct of eligible workers in the work force. Today, he said, only 38 pct of organizable workers belong to unions.

In addition, the only unions which are winning large groups of new members are those outside the AFL-CIO, such as the Teamsters.

A warning was sounded at the meeting by Joseph R. Beirne, president of the Communication Workers of America. He said that the dwindling proportion of unionized workers **"means the obituary for organized labor"** unless the trend is quickly reversed.

The proportionate decline in unionism, Mr. Livingston is said to have told the group, is at least partially due to rapid growth of white collar employees accompanied by a decline in the number of blue collar workers.

The implication: Organize office workers and technicians, or see the unions slowly die.

TALK ABOUT ABILITY!

This husky boasts a 100 hp main drive motor and spindle speed range of 6 to 750 rpm. Its massive 7½″ tailstock spindle offers big load capacity. Pre-selective hydraulic powershift and push button control of cross and longitudinal feeds keep this giant under fingertip control. 48 spindle speeds provide any surface speed with a deviation of less than 6% from that actually required for the chosen diameter. The operator, after setting the correct surface speed, merely dials the work diameter. The computing dials then automatically produce the correct rpm for each diameter. Or . . . the operator may choose rpm directly if he wishes. Write for Bulletin 913-A.

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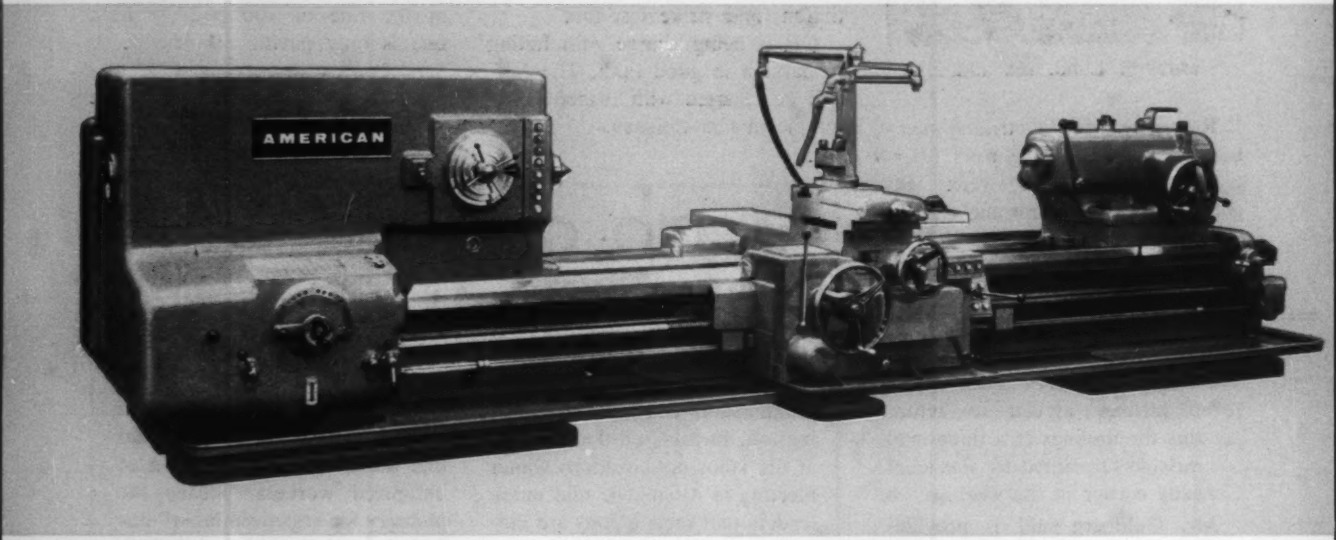

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WASHINGTON

By R. W. Crosby

★Tougher Anti-Trust Penalties?

Demands are erupting in Congress for harsher penalties for antitrust violations by corporations and their executives.

Legislation has been introduced in Congress to:

(1) Bar any person convicted of antitrust law violations from holding office in any corporation.

(2) Force public disclosure when companies submit identical bids for government contracts.

The demands stem from the recent antitrust case in the electrical manufacturing industry. Congressmen are criticizing present penalties as "not being of a sufficient threat to prevent executives of some of the biggest corporations in the land from doing things that everybody knows to be illegal."

Sen. William Proxmire, (D., Wis.) who introduced the bill to bar antitrust violaters from corporation office, says:

"The recent case in the electrical manufacturing industry shows that a bank teller who embezzles $1000 can be sent to jail for 10 years, but the big corporation boys who conspire to defraud the government of $10 million will probably draw a light fine or at most a 30-day sentence."

Rep. Wright Patman, (D. Tex.) who introduced the public disclosure bill, says it would protect the public from "price fixing and bid rigging" by corporations.

His bill would require the Federal agencies to report receipt of identical bids to the Attorney General. The bill invites state and local governments to do the same.

Armed with this information, the Attorney General would report to Congress on the bids every three months. The report would be published as a House document and made available to the public.

Congress to Study Scrap Reporting

Congressional plans are underway to "strengthen the reporting practices covering the scrap steel industry." The new statistics will be used in government antitrust procedures.

In the annual report of the Senate Small Business Committee, Sen. John Sparkman, (D., Ala.) says the committee "discovered some serious deficiencies in the statistics of the scrap industry which constituted a handicap to the detection and enforcement of antitrust violations."

Sen. Sparkman claims: "The Bureau of Mines survey of dealers, brokers, and automobile wreckers was based on the voluntary filing of replies, with the result that it covered only a small and unknown fraction of this industry."

He now proposes to institute a scientific sampling procedure to cover a known factor of industry and narrow the margin of error. The collection of data based on the separation of purchased steel scrap into the categories of "obsolete" and "prompt industrial," as well as the collection of data by geographical areas, is also being studied.

Speedy Action on Unemployment Likely

Speaker of the House Sam Rayburn promises fast consideration of President Kennedy's $1 billion emergency plan to extend unemployment benefits for the jobless.

Employers would pay the cost of the program through a temporary two-year boost of the Federal payroll tax. It would be increased from 3.1 to 3.5 pct.

The House Ways and Means Committee approved the plan last week.

Small Man to Get More Defense Money

The Pentagon plans to give small businesses a larger share of defense contracts. Defense Secretary McNamara promises these steps will be taken:

1. To find greater opportunities for procurement set-asides for small business, as permitted by law.

2. To encourage prime contractors to make greater efforts to increase the competitive opportunities for small businesses.

Mr. McNamara says, "President Kennedy attaches considerable importance to this matter, and he asked me to place additional emphasis on assuring participation by small business in defense procurement programs."

Construction Men Eye Educational Aid

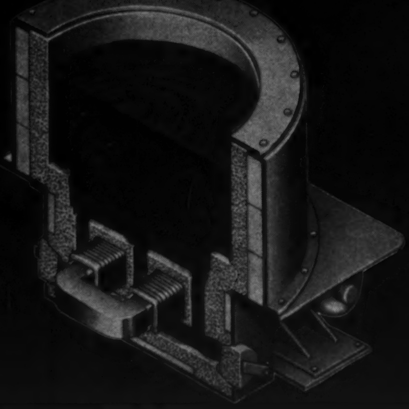
The construction industry will get a big boost if the Administration's education program is okayed by Congress.

The program calls for $5.6 billion in Federal aid to education, much of it to build public schools. The President says steps must be taken to build a total of 600,000 classrooms in the next 10 years.

In addition, the program extends the college housing loan program for five years at $250 million a year, and provides $300 million a year in loans for five years to help build college classrooms, laboratories, libraries and other facilities.

FOR NEW IDEAS IN

HEATING AND MELTING BY INDUCTION . . .



WATCH

AM

Core-type melting furnace, one of many products of AM, for the heating or melting of metals by induction.

"induction heating is our only business"

Ajax Magnethermic CORPORATION

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World Steel Output Hits New High

World steel production in 1960 set a new record. A total of 355.6 million net ingot tons was produced last year, according to Dept. of Commerce. This tops the 1959 level of 321 million tons by 11 pct.

Commerce figures exclude Communist China production because accurate statistics are not available.

U. S. steel production last year accounted for 28 pct of the total—99.3 million tons. Russia ranked second with 72 million tons or 20 pct of the total.

The highest rate of increase was noted by Japan where production climbed 33 pct last year. Italy, Great Britain, West Germany and France also gained in steel production. The U. S. increase was 6 pct; Russia gained 9 pct.

U. S. Scrap Exports At Record Levels

Iron and steel scrap exports reached a new high of 7.2 million tons last year. Figures recently released by Dept. of Commerce note that increased shipments to Japan, Italy and West Germany were largely responsible for the gain.

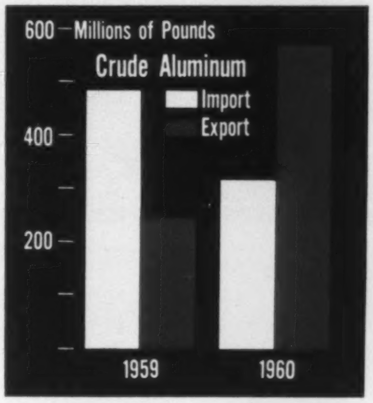
The 1960 tonnage is more than two million tons above 1959 exports. Value of the 1960 shipments —$242 million—is $76 million higher than in 1959.

Japan was the best U. S. customer for ferrous scrap last year. It purchased 3.5 million tons, or approximately 49 pct of the total U. S. overseas shipments.

Aluminum Exports Doubled in 1960

Increased demand abroad, especially from Britain and West Germany, pushed U. S. exports of crude aluminum to more than double that of 1959.

According to the Dept. of Commerce, exports totaled 570 million lb last year. This is compared to the 242.2 million lb exported in 1959.



Shipments to West Germany increased 302 pct from 1959; exports to the United Kingdom were up 115 pct. France, Yugoslavia, Japan and the Netherlands also bought increased tonnage.

British Steel Hit By Auto Recession

Plagued by the recession in the British auto industry, Great Britain's steel producers are finally reducing output. But the effect on the steel industry there hasn't been nearly as drastic as originally feared.

The Steel Co. of Wales has put 2000 production workers on a 38-hour week instead of the normal 42-hour week. Another major producer says it has cut its output by 15 pct. But this is a temporary status expected to last only a few weeks.

Chief among the reasons for the steel industry's continued strength: The ability to switch production emphasis. For example, recently some steelmakers have concentrated on plate production. One mill is using sheet intended for automakers in electrolytic tinning baths.

However, further output reductions may come for Britain's steel industry before the auto market regains strength. Present inventories are reported to be sufficient to meet increased demand.

Tariff Adjustments

Suggestions are being made in Congress to adjust U. S. tariffs to the labor conditions of foreign countries.

Rep. Charles S. Joelson (D., N. J.), who proposes the tariff adjustment, says it would impose restrictions on products produced by "exploited" foreign labor.

Pipe for Russia

England's Grangesberg Group has signed a $24 million contract with Russia calling for the delivery of 150,000 tons of welded steel pipe for oil and gas lines.

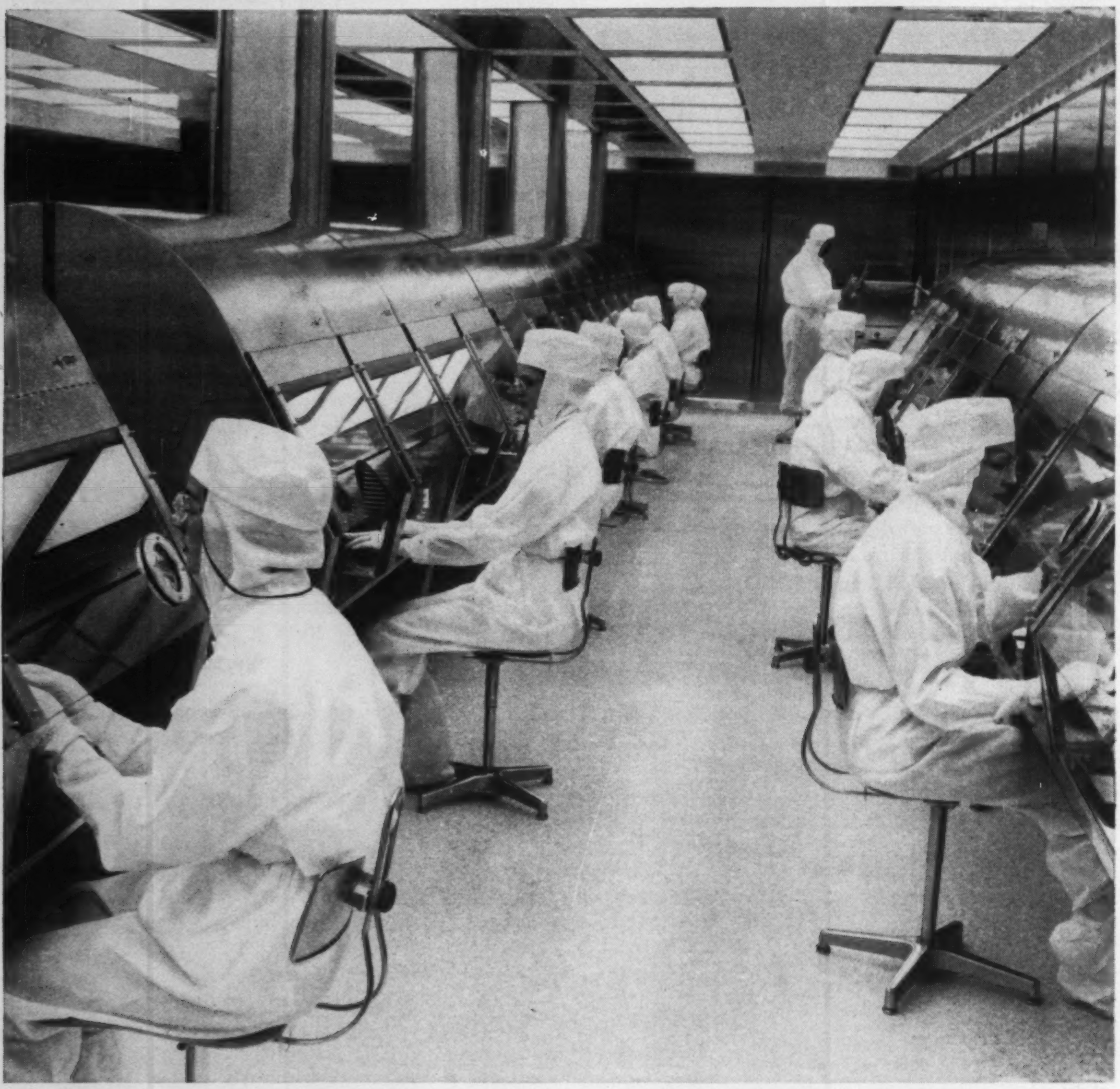
Under the agreement, small tonnage will be delivered in December and an average of 50,000 tons a year will be shipped to U.S.S.R. before 1964. Plate for the pipe will be rolled at the new steel works in Oxelosund.

Japanese Visit Planned

The Japanese government says a trade mission will visit the United States soon. Foreign Minister Zentaro Kosaka announced the third annual mission will be led by Taizo Ishizaka, president, Federation of Economic Organizations.

The mission's complete itinerary is still incomplete, but Washington sources say the one-month trip will definitely include visits to New York and Washington.

NEW DEPARTURES IN MINIATURE



ULTRA-CLEAN INCUBATORS FOR M/I* BALL BEARINGS

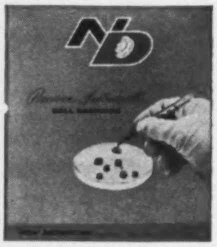
N/D'S NEW WHITE ROOM PROVIDES ULTRA-CLEAN ENVIRONMENT FOR M/I BALL BEARING ASSEMBLY

N/D announces a new White Room at Sandusky, Ohio incorporating the latest technological advances available today. This new room provides a virtually dust-free atmosphere so necessary for the production of Miniature and Instrument Ball Bearings of high reliability.

Environmental controls within the room hold temperature to plus or minus 1°... with maximum relative humidity only 40%. Final air filtration into room removes particles larger than 3/10 micron. A complete air change is made every three minutes. All authorized personnel entering the room are thoroughly bathed by air showers in two successive deduster chambers.

You can benefit from New Departure's 25 years of experience in M/I ball bearing production by calling your nearby N/D Sales Engineer. Or write Department L.S., New Departure, Division of General Motors Corporation, Bristol, Conn.

*Miniature and Instrument Ball Bearings.



SEND FOR NEW DEPARTURE'S M/I BALL BEARING CATALOG TODAY. WRITE DEPT. L. S.

NEW DEPARTURE
MINIATURE AND INSTRUMENT BALL BEARINGS

Ultrahigh-Strength Glass

Glass which is lighter than aluminum, harder than high-carbon steel and five times as strong as conventional steel alloys has been produced in the Soviet Union. With a melting point of 1500°C, the new glass withstands temperatures well above 1000°C. Atomic bombardment produces a dense, abrasive-resistant structure. Small lithium ions and calcium-sulphide molecules replace some of the potassium and sodium ions.

Plasma-Gun Brazing

Using a positive-feed powder hopper, a plasma gun sprays brazing particles in sizes ranging from 5 microns to 100 mesh. Thus, the gun controls a wide range of coating thicknesses. Surfaces have been joined with thin plasma-spray coatings less than 0.001 in. thick.

Coatings Aid Fabricators

Strippable vinyl coatings prevent marring and scratching of polished, embossed or coated metals during fabrication, storage and shipping. Since these coatings are flexible, protected metal surfaces can be roll formed, drawn, corrugated or embossed—in many cases without lubrication. Vinyl coatings reduce die wear. Also, there's no need for final cleanup after fabrication.

Joint Is Cast in Place

Pouring one casting around another yields a neat-looking and reliable conveyor hook. As malleable castings, all parts are joined during the casting process. The stud or pivot is cast first. Still in its hard-iron state, the stud is then placed in a mold which has been prepared for the hook member. When the hook section is poured, flowing metal encircles the stud. Each hook rotates into four different facing positions.

Arc-Zone Refining

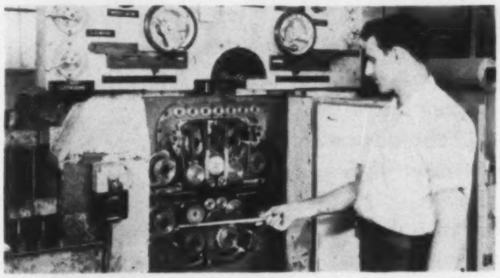
Czechoslovakian engineers have built a unit that simplifies the zone refining of metals. This unit uses an electric arc, between a tungsten electrode and the metal, as the heat source. In refining highly reactive refractory metals, the new unit offers many advantages. Unlike electron guns, it doesn't require a vacuum. Any atmosphere, including an active atmosphere, can be used. Spectral analyses uncover no traces of tungsten or copper in the final products.

Eases Paint Removal

Glycols boost the efficiency of commercial paint removers by about 75 pct. Adding high-boiling high-flash-point glycols and/or triols to alkaline-organic paint removers increases their stripping power. These additives also improve the rinsibility of residual soapy films.

Maintenance Costs Tumble

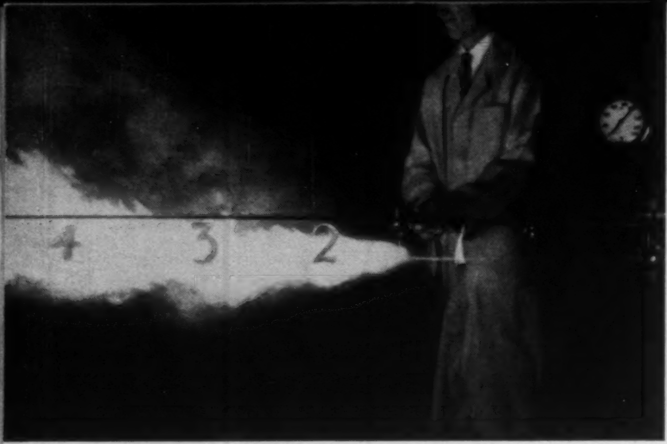
Molybdenum-disulphide thrust washers, filled with nylon, solved a costly maintenance problem at the Wallingford Steel Co. These washers serve in two Sendzimir rolling mills. By controlling each mill's work-roll pressure, they insure consistent stainless-foil thicknesses down to 0.00075 in. Previous washers lasted less than 2 months. The nylon-filled washers outwear their metallic predecessors by a factor of 24:1.



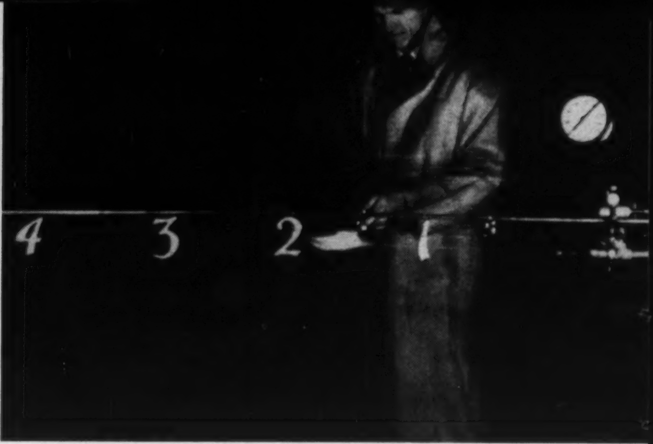
ROLLING MILL uses nylon-filled washers.

Decimal Inch Pushed

Several standards groups from production fields, working within the ASA frame, are reviving proposals for adoption of the decimal inch. These groups hope to avert any move to switch the metalworking industry to the metric system. They claim the decimal inch yields many advantages, with few of the problems that would result from a changeover to the metric system.



Ordinary hydraulic fluid made from mineral oil is ignited by open flame. Torch is 18 inches from nozzle orifice.



Shell Irus 902 Hydraulic Fluid, in the same test, refused to be ignited by 3000-degree flame.

BULLETIN:

3000-degree flame does not ignite Shell Irus 902—the fire-snuffing hydraulic fluid that helps make factories safe from fire

Shell forced Irus® 902 Hydraulic Fluid through a .145-inch orifice at 1000 psi pressure. The Irus Fluid was sprayed from the orifice and a 3000-degree flame thrust into the streaming fluid. Irus was not ignited.

Read the advantages of economical Shell Irus 902 and how it can protect your plant.

IRUS 902 is the fire-snuffing hydraulic fluid that protects lives and equipment.

How Irus works

Irus 902 is an ingenious combination of oil and water. The water is encased in a film of oil. In technical terms, it is a 100% water-in-oil emulsion.

But unlike other emulsions, Irus 902 has optimum stability. This is vitally important. It means that Irus Fluid will retain its lubricating qualities far longer than unstable oils—and will not allow the water to separate out. Result: the water stays in the oil, ready to snuff a fire if needed.

Other advantages

1. Cools off systems. Because of its high rate of heat transfer and high heat capacity, Irus 902 can allow hydraulic systems to run cooler.

2. Resists thickening and thinning. The viscosity of Irus 902 is tailored to protect pump parts during the entire working cycle—from cold start-up to hot, continuous operation.

3. Saves gaskets, packing, hose. Irus 902 is gentle to nonmetallic parts as well as metal. It can be used almost anywhere that you'd use mineral oil.

4. Resists foaming. Irus 902 does not hold captive air. If air is introduced, Irus 902 quickly releases it.

5. Easier to spot leaks. Irus 902 is bright yellow, helps you spot leaks quickly.

For complete details about changing over to Shell Irus 902, contact your nearest Shell Industrial Products Representative. Or write: Shell Oil Company, 50 West 50th Street, New York 20, N. Y.

A message to manufacturers of hydraulic equipment

Shell Irus 902 makes an excellent initial fill.

1. It is available anywhere in the U.S.A.

2. Quality of Irus Fluid is consistently high. It must meet strict Shell specifications.

SHELL

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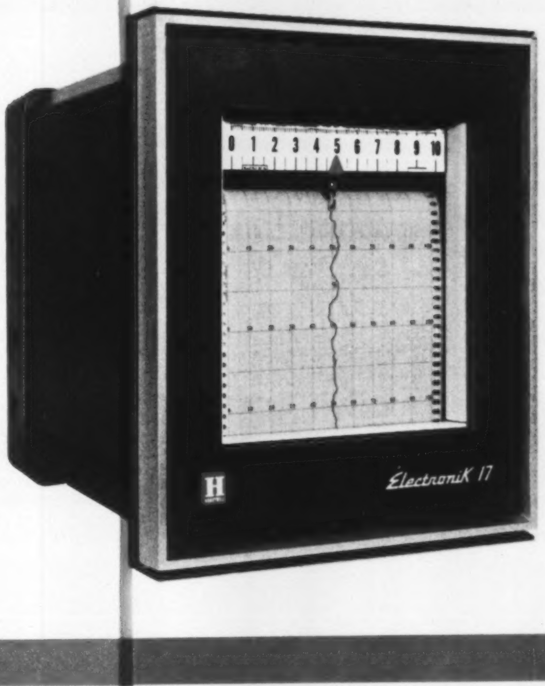
—where 1,997 scientists are working to provide better products for industry.

ow you can get . . . revolutionary rebalancing unit
. . modular construction . . . ±0.25% accuracy . . .
n a small-case potentiometer . . . the advanced all-new

ElectroniK 17*

HONEYWELL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ElectroniK 17

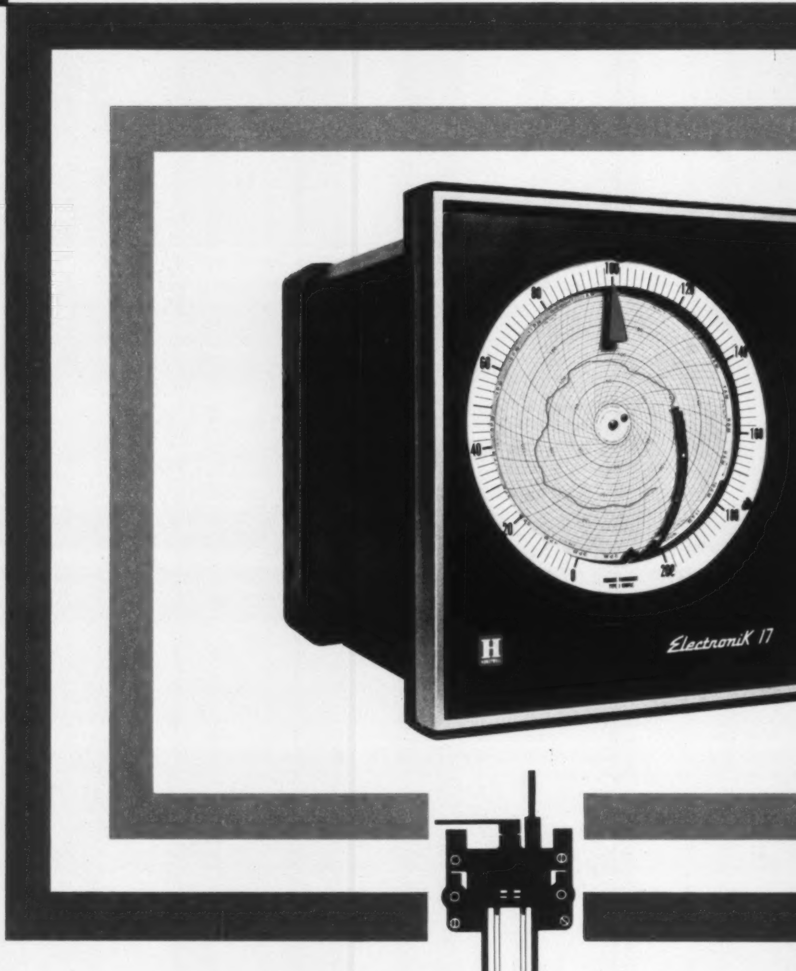
ow you can get . . . revolutionary rebalancing unit

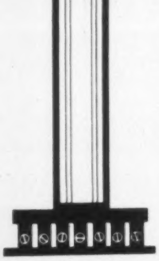
. . modular construction . . . ±0.25% accuracy . . .

n a small-case potentiometer . . . the advanced all-new

The *ElectroniK 17* wi*

HONEYWELL





NO SLIDEWIRE, NO
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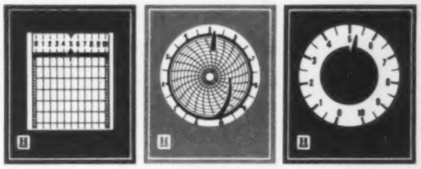


will save you more time, trouble, dollars and maintenance than any other potentiometer on the market today.

- New STRANDUCER* replaces slidewire
- New control system with plug-in units
- New modular construction
- New economy

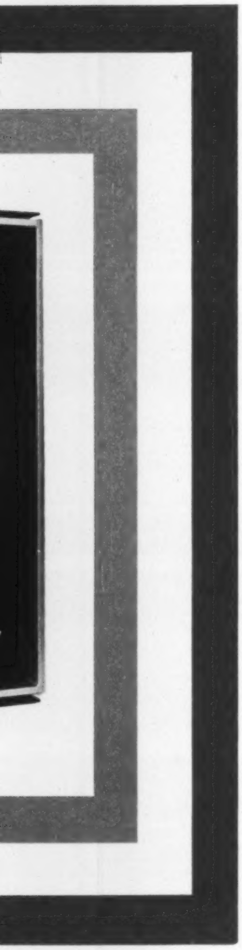
. . . and other pace-setting features.

ElectroniK 17 potentiometers are completely new Honeywell recording and control instruments, compact enough to fit standard 19-inch relay racks. They perform reliably, have ±0.25% calibrated accuracy, and incorporate new design advances which make them the easiest of all potentiometers to operate, convert, and maintain.

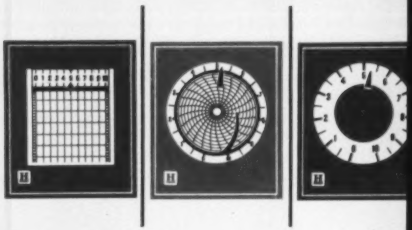
You can get *ElectroniK 17* instruments as strip or circular chart recorders or circular scale indicators. You can get electric contact control with up to 8 contacts. Control units are of plug-in type.

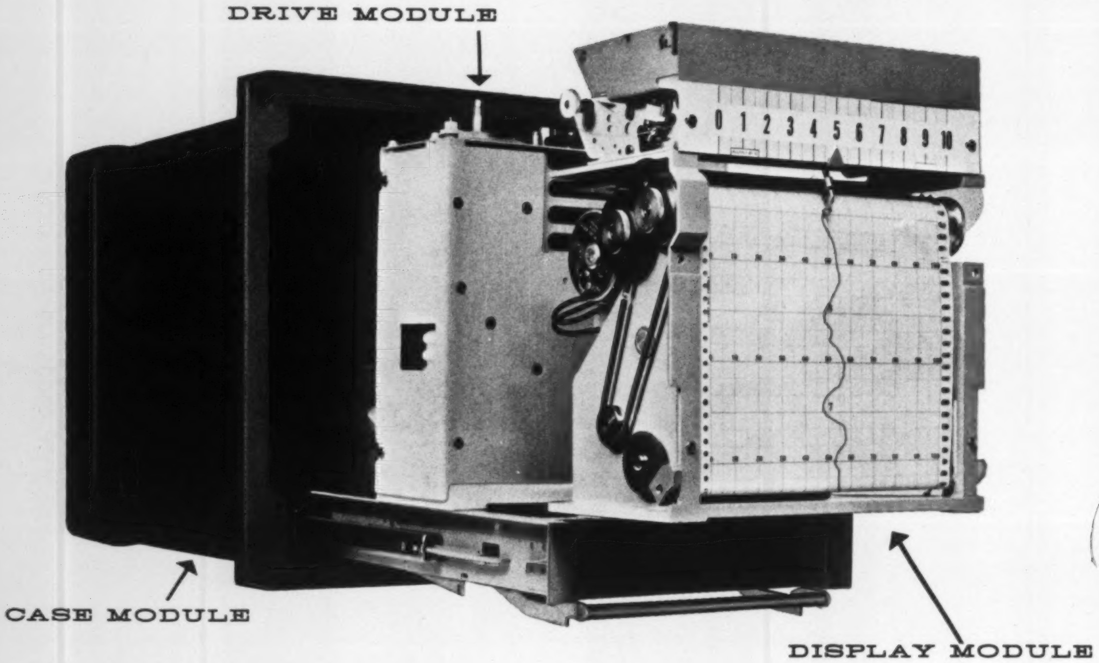
With *ElectroniK 17* potentiometers, you not only get uninterrupted performance, but also save money in initial cost, operating expense, and maintenance. You will find this new potentiometer far more economical to operate than any other available today. The following page will tell you why.

*Trademark



NO SLIDEWIRE PROBLEMS. The unique STRANDUCER rebalancing
vation in potentiometer design, replaces the conventional slidewire. It
ain gage principle and consists of four looped wire strands which form
s of a Wheatstone bridge. Both STRANDUCER and pen carriage are
tentiometer balancing motor. A change in electrical input causes the
o change the tension—and electrical resistance—of the STRANDUCER.
es the balancing motor to rebalance the bridge, at the same time repo-
rument pen or pointer. The STRANDUCER is unaffected by corrosive
has no contactors. It has unusually long life and infinite resolution,
when the instrument is subjected to ambient temperatures up to 130°F.





MODULAR CONSTRUCTION. *Modular construction and plug-in components make the ElectroniK 17 the easiest of all potentiometers to operate, convert, and maintain. Component interchangeability cuts service downtime, minimizes spare parts inventory.*

WIDE CONTROL POSSIBILITIES. You can have up to 8 control relays. Up to 8 plug-in contact control units fit into inside back of case.

INTERCHANGEABLE DISPLAY MODULE. You can switch easily from strip to circular chart, to circular scale operation . . . reduce your spare parts inventory because you can stock a single spare module for several instruments.

FRONT ADJUSTMENTS. You adjust damping and gain from the front of the instrument, using only a screwdriver.

QUICK-CHANGE DRIVE GEARS. You can change chart speed to ½ or 2 times basic speed in a matter of seconds by replacing quick-change drive gears. Standard basic chart speeds: 1, 2, 6, 10, or 60 inches per hour.

EASY RANGE AND ACTUATION CHANGE. Simply change range card attached to actuation board. A screwdriver is all you need. Universal reference junction compensator serves *all* types of thermocouples; you can quickly remove it to convert to some actuation other than thermocouple. Filter network rejects loop stray signals.

COMPACT EASILY-REMOVED TRANSISTOR AMPLIFIER. With only a screwdriver you can remove the amplifier for servicing.

NO STANDARDIZATION. Zener diode constant current unit does away with need for battery and standardizing mechanisms.

COMPACT CASE SAVES SPACE. With a height of 13¼ in., a width of 11 in. and a depth of 16⅝ in., the *ElectroniK 17* fits a standard 19-inch relay rack. Attach carrying handle to case, and you have a portable instrument. You need no tools to quickly remove door for easy access or conversion from one type of display module to another.

TERMINAL BOARD AND PULL-OUT CHASSIS You can pull out the chassis to the service position without tools and without interrupting the operation of the instrument, or completely remove it. Flexible wiring drawbridge keeps instrument operating when chassis is pulled out to service position, unplugs for removal of components. All external wiring connections go to terminal board at back of instrument case.

For complete information on the *ElectroniK 17*, call your nearby Honeywell field engineer or write to MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.—In Canada, Honeywell Controls Ltd., Toronto 17, Ontario.

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First in Control
SINCE 1885

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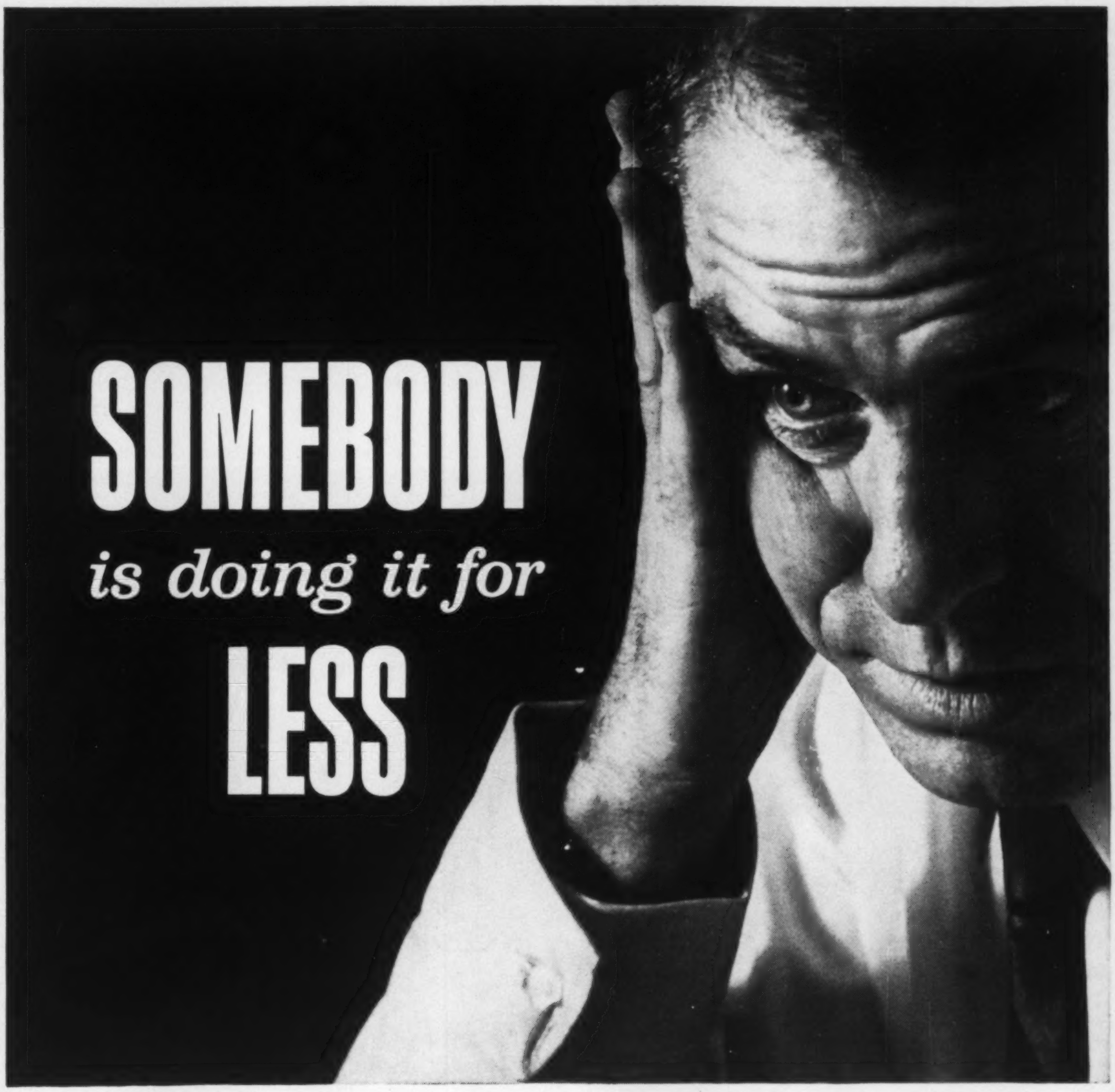
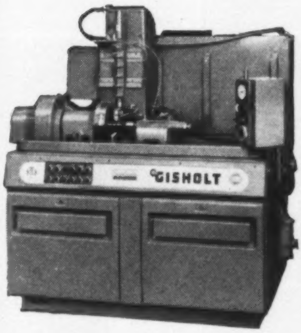


MASTERLINE® 51B SUPERFINISHER

Newest in the line—for parts not requiring traverse of the Superfinishing stone. A longitudinally adjustable platen supports a reciprocating unit holding one or two stone-carrying quills. Add a second platen and you can handle up to four diameters at once—automatically.



A similar **Model, 52A** offers longitudinal stone traverse. You can select from a complete line of general-purpose and high-production machines and attachments. Call your Gisholt Representative or write for Catalog 1159-C.

Are you giving your competitors a decisive edge by using outdated surface-finishing methods?

If you need a controlled finish (1 micro-inch RMS to 80) on cylindrical, tapered, flat or spherical surfaces, Superfinishing will cut your costs and improve quality.

In many cases you can Superfinish® direct from a turned surface and eliminate grinding. On other parts you rough-grind, then Superfinish. Your finish is produced in seconds, *automatically*, piece after piece!

You save on initial investment, grinding-wheel costs, production time, work-handling, and floor space. With optional "size control" you can even eliminate final inspection.

GISHOLT

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Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes • Factory-Rebuilt Machines with New-Machine Guarantee

AT BLACK & DECKER

Jalcase 100 Cold Finished Bars Speed Tool Parts Production 50%

Here's what happened when Black & Decker Manufacturing Co., Towson, Maryland, switched from alloy grades 4140 and 8620 to J&L Jalcase 100 cold finished bar steel in the production of shafts, gears and pinions for portable electric tools:

- The free machining quality of Jalcase speeded production on automatic screw machines 50%.
- The uniform machinability of high strength Jalcase eliminated ½ hour per shift from machine downtime for tool changes.
- The strength and hardness of Jalcase have practically eliminated the need for subsequent heat treating and resultant part distortion.
- The combination of these production economies plus the lower initial cost of Jalcase over alloy grade steel has greatly reduced parts costs.

The free machining qualities of J&L Jalcase 100 plus its high strength, hardness and stabilized stresses make it an ideal cold finished bar steel for producing high quality machined parts for the metalworking industries.

Jalcase 100 has a minimum yield strength of 105,000 psi in round bar sizes to 1½" diameter and a minimum yield strength of 100,000 psi in sizes to 3½" diameter.

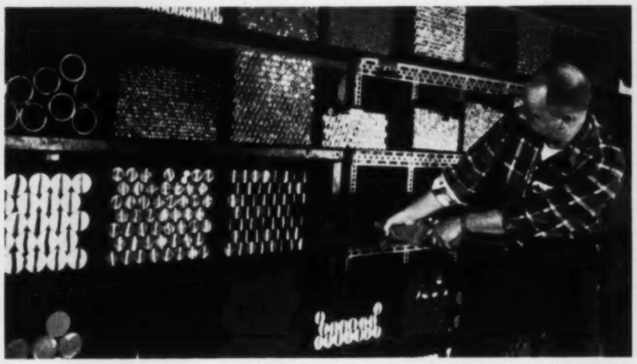
Jalcase 100 has a minimum hardness of 248 Brinell up to 1½" and 241 Brinell for larger sizes. It is also available with a lead addition, designated as Jalcase 100-L, for applications requiring superior machinability.

For literature write direct to *Jones & Laughlin Steel Corporation, Department 480, 3 Gateway Center, Pittsburgh 30, Pennsylvania.*

Steel

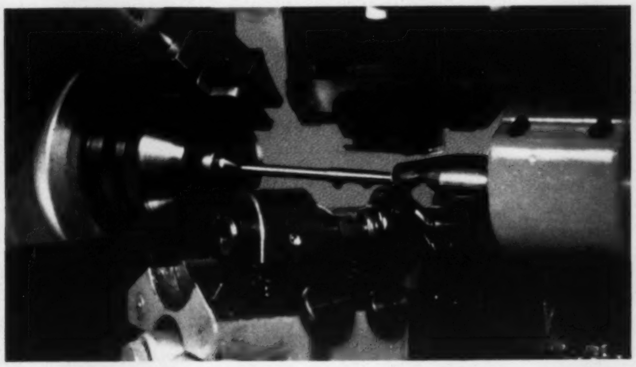
This Steelmark identifies products made of steel. Place this mark on your products. And—look for it when you buy.

Jones & Laughlin Steel Corporation
PITTSBURGH, PENNSYLVANIA
Where cold rolled steels originated in 1859



Black & Decker relies on a great variety of J&L bar stock. Over 30 electric tool parts are made from Jalcase 100 alone.

Made from Jalcase 100, these armature shafts are used in Black & Decker's ¼" Portable Electric Utility Drill.



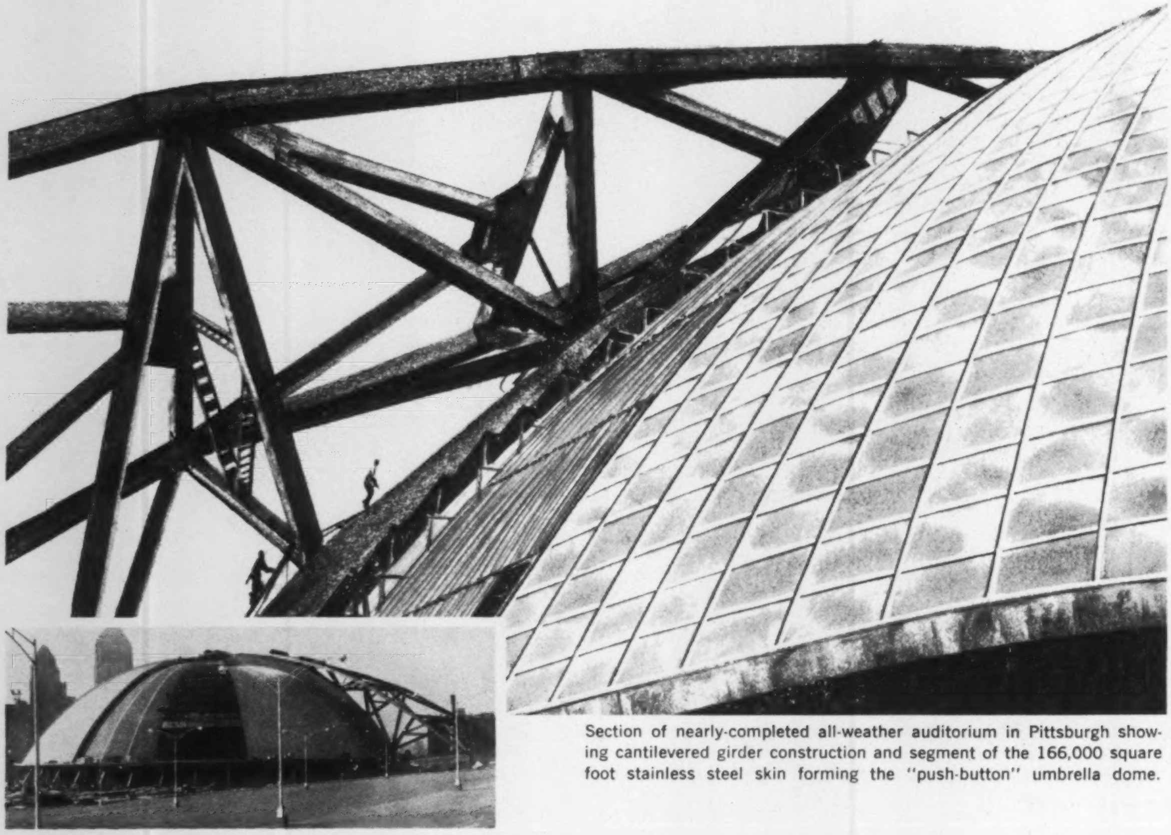
▲ Black & Decker hobs pinion gears made of Jalcase 100 to tolerances of less than .001".

◀ Palletized trays transport a few of the many B&D machined parts that are made from J&L bar stock.

J&L

STEEL

when you're producing Electric Steels



Section of nearly-completed all-weather auditorium in Pittsburgh showing cantilevered girder construction and segment of the 166,000 square foot stainless steel skin forming the "push-button" umbrella dome.

GLC Electrodes will give you these extra values

When you specify GLC electrodes you get a product
of **superior quality, plus** such extra values as...
unceasing research that leads to steady product improvement...
substantial inventories maintained for your convenience...
fast shipment and delivery...
and **technical service** for customers
that is remarkably prompt and competent.
These extra values are important as they provide
a substantial share in the reduction of melt-ton costs.

PRODUCTS ELECTRODE GLC DIVISION YOU CAN TRUST ®

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LETTERS FROM READERS

Trying Moments

Sir—While any coverage of a point is appreciated, when you go through life with a simple name like Smith why does someone have to complicate it by mis-spelling it? In the story "Will U. S. Lower Aluminum Tariff?" (IA, Feb. 9, p. 156) this was the case.

However, your analysis of the situation is excellent. What we wanted would not hurt the domestic producers, who already are using subterfuges that are too numerous to list to sell material at discounts. Never before has there been price cutting in pig and billet. Underlings (not top management, hence not necessarily true) feel that this is a forerunner to a reduction in tariff, a resultant (not quickly) reduction in price with the scurry to "match" each other that goes on with producers. Perhaps they really think that they have "lost" their case?—Milton J. Smith, president, Trim Alloys, Inc., Boston, Mass.

Valuable

Sir—In pointing out to your readers that useful life, not initial cost, is the key to good buying in a defense procurement, you have, I believe, performed a valuable service. Your recent article "Changes Asked in Defense Buying" presented the case fairly. I hope it will help to bring about improved procurement practices.—W. A. MacDonald, chairman of the board, Hazeltine Corp., Little Neck, New York.

Advice Seeker

Sir—Since our product is made of steel we believe that it might be to our advantage to point up this fact by using the steel industry's symbol on our sales literature and advertising matter.

Perhaps you could advise us as to where we should apply for permission or authorization to make such use of the symbol. — Fred Grady, sales promotion manager, Phillips Drill Co., Michigan City, Ind.

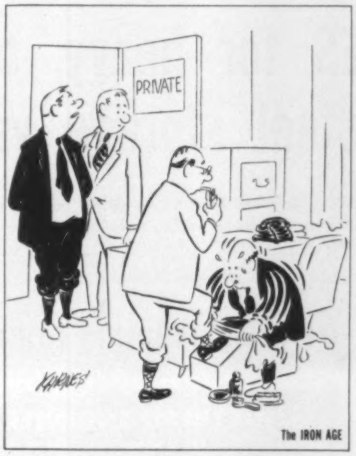
■ The "Steelmark" symbol identifies products made of American steel. Labels and stickers are available through steel suppliers.—Ed.

Reader's Aid

Sir—Referring to a recent "Letters from Readers" column in The IRON AGE, I read that Mr. G. F. Burton of London is interested in "Bull of the Woods" cartoons by J. R. Williams.

At least two books of cartoons by the late Mr. Williams have been published by Charles Scribner's Sons in New York. These books are entitled: "The Bull of the Woods and Out Our Way," and "Cowboys Out Our Way." I cannot say if they are still available since our copies were purchased in 1951 and 1952.

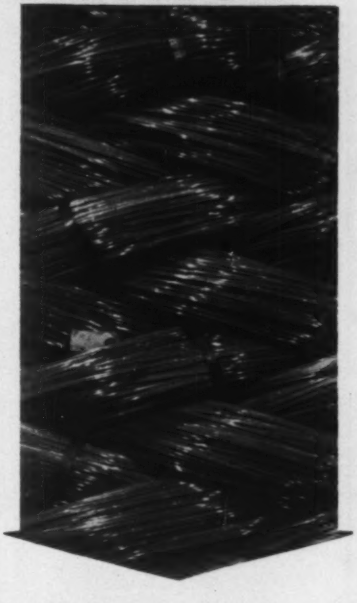
However, I hope he gets them for I'm sure he'll enjoy them as we have.—George C. Campbell, Ankeny, Ia.



"Can't beat these fringe benefits!"

STANDARDIZE 100% ON SOUTHERN FASTENERS

FOR FASTER SERVICE



The "S" in Southern could stand for service and stock, because Southern has both. Both are products of Southern's specializing in top quality USA-made standard fasteners for 15 years.

When you want faster service on quality screws and bolts, you can rely on Southern Screw's 1,500,000,000-piece stock in the Statesville, North Carolina factory and warehouse, or from fully stocked warehouses in New York, Chicago, Dallas and Los Angeles which supply Southern's vast network of distributors.

Standardize on Southern for every threaded fastener requirement for quality as well as service. Write or phone today for current stock list. Address: Southern Screw Company, P.O. Box 1360, Statesville, N. C.

Ask for details about Southern Screw's palletizing-packaging system, designed to save you time, labor and storage space. It's another free service to industry by Southern Screw.

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Machine Screws & Nuts • Tapping Screws
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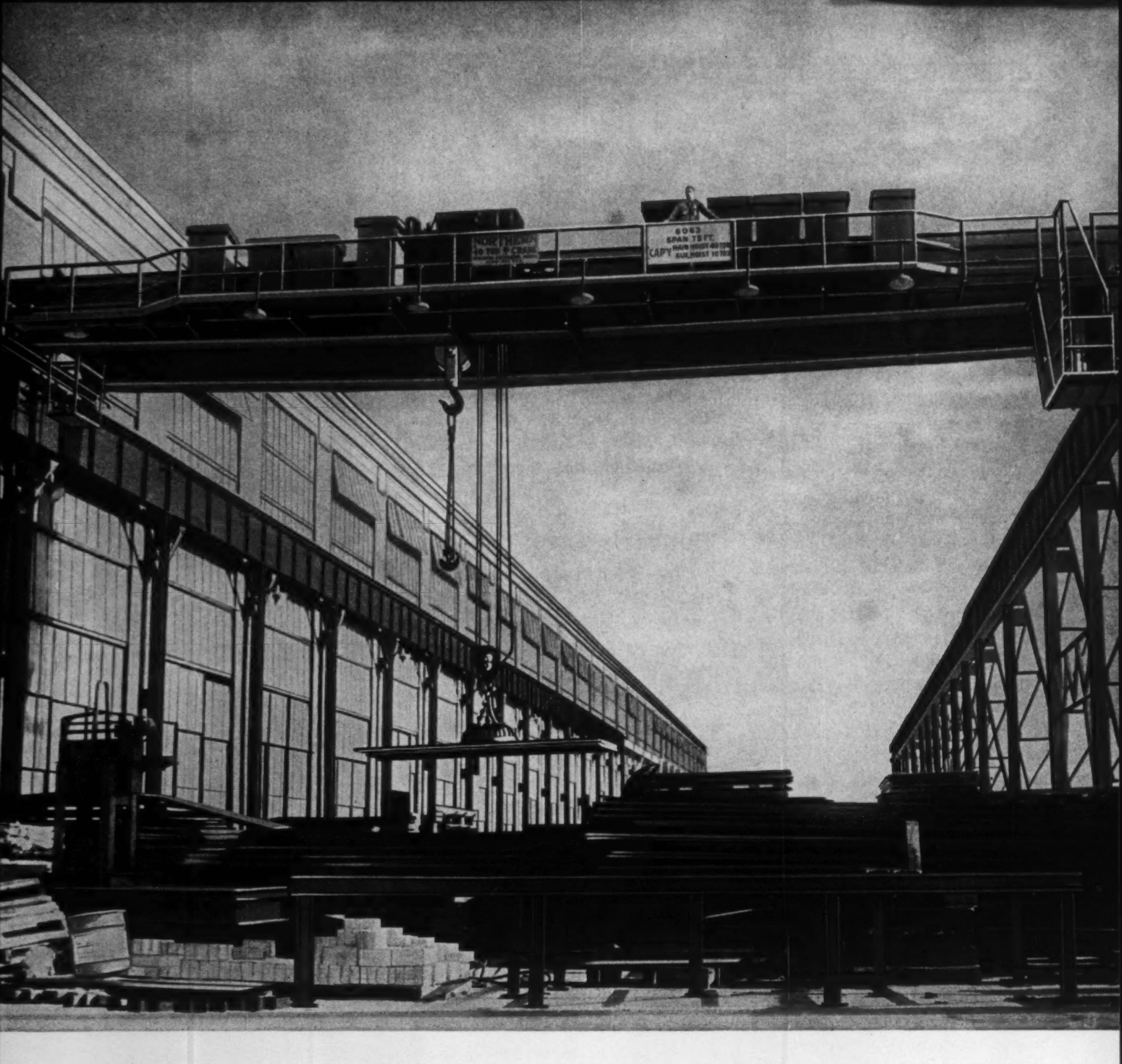

NORTHERN CRANES for heavy, continuous service in steel storage yards

This 40/10-ton, 75-foot span heavy duty magnet crane was designed for extremely severe service, and was equipped with newly developed electrical control equipment to provide maximum handling efficiency.

The above installation, in a large electrical equipment manufacturing plant, is typical of many similar Northern Crane installations in steel mills, fabricating plants, and like service in heavy industry.

Northern heavy duty cranes are designed and built to meet the most exacting requirements, providing for continuous service under severe operating conditions, handling maximum loads, and with high impact allowances. Mill type motors and controls provide highest electrical performance.

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FATIGUE CRACKS

Moses and Management

The management ideas and principles of Moorhead Wright, author of this week's cover story, (p. 71) and head of GE's Management Research and Development Institute, are as modern and as up-to-date as you'll find anywhere. But his research goes back many, many years —thirty-three hundred, in fact.

To understand the depth of this research, you must know a bit more about Mr. Wright. He's national chairman of The Laymen's Movement for a Christian World. He has also lectured at the Harvard Divinity School on the relationship of the businessman and the clergy.

Exodus: 18—Mr. Wright's research has included the Bible. And recently, after discussing this week's cover story with IRON AGE associate editor John Baxter, he handed him a 7-page tract entitled, "The First Record of Scientific Management."

Authored by Mr. Wright, it refers to the eighteenth Chapter of Exodus where Moses is counseled by his father-in-law, Jethro. After watching the people of Israel stand by Moses "from morning unto the evening" to make judgments for them, Jethro said: ". . . this thing is too heavy for thee, thou art not able to perform it thyself alone."

Delegated Authority — Moses heeded this counsel to carry out the first recorded delegation of authority, as a basic premise of modern management.

Jethro, who Mr. Wright refers to as "probably the first management consultant," also urged Moses to teach the laws to the people. Says Mr. Wright: "In our modern concept, we call this published policy."

Jethro also had Moses arrange things so that only "great matters" were brought to his attention. This is the first recorded case of the very modern concept of "management by exception" now stressed by the American Management Assn. and other management analysts.

Mr. Wright, you can see, is not one to dally with mere pre-war and post-war management ideas. He looks behind as deeply as he looks ahead.

Automaker's Talk

Every industry has its own trade jargon. And the auto assemblers are no exception.

Chrysler Corp. advises us the use of terms like "frog legs" and "cat's whiskers" are accepted terminology. Their meaning? Cat's whiskers—the fuzzy sealing strip fastened to the door or body panels and inside trim panels which comes in contact with the glass and effects an air and water seal.

Bull Rings and Fish Eyes—Frog legs are the wire fasteners for mouldings and panels which have a diamond-shaped form as the flexible retaining system to the body panels.

Here are other colorful terms used by the automakers:

Baby Bath—The well lining into which the convertible top folds.

Boomerang—Any moulding having a wide-open "U" shape.

Bull Ring—Area of the assembly line where body shell is welded together.

Disneyland—Engineering section of an assembly plant.

Fish Eye — Indented finished washer used under the heads of trim part screws; a French washer.

Jitterbug — A power-driven tool used for sanding bodies.

Pork Chop—Windshield garnish moulding.

Spaghetti — Vacuum tubes for heater controls.

Tack Spitter—Man who drives tacks in assembly of convertible tops or windcord.

Hyde Park
Rolling Mill Equipment
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Stretcher Levellers

Complete range of stretching capacities from 150 to 750 tons, for levelling ferrous and non-ferrous sheets in sizes up to 120" wide x 500" long.

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***RESINALL** . . . an all-resin-bonded aggressive belt of strong X-weight cloth, for maximum heat resistance in most all rough and intermediate grinding operations.

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(Guard has been removed from machine for photo.)

COMING EXHIBITS

Western Metal Show — March 20-24, Pan Pacific Auditorium, Los Angeles. (American Society for Metals, Metals Park, Novelty, O.)

National Packaging Show — April 10-13, Lakefront Exposition Hall, Chicago. (American Management Assn., 1515 Broadway, Times Square, New York 36.)

Welding Show — April 17-21, New York Coliseum, New York. (The American Welding Society, 33 West 39th St., New York 18.)

Powder Metallurgy Show — April 24-26, Hotel Sheraton - Cleveland, Cleveland. (Metal Powder Industries Federation, 60 E. 42nd St., New York.)

Castings Show—May 8-12, Brooks Hall, San Francisco, Calif. (American Foundrymen's Society Golf & Wolf Rds., Des Plaines, Ill.)

Design Engineering Show — May 22-25, Cobo Hall, Detroit. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17.)

MEETINGS

MARCH

Can Manufacturers Institute, Inc.—Annual & Board meeting, Mar. 6, Waldorf-Astoria, New York. Institute headquarters, 821 15th St., N. W., Washington, D. C.

Steel Founders' Society of America—Annual meeting, Mar. 11-14, Drake Hotel, Chicago. Society headquarters, 606 Terminal Tower, Cleveland.

Industrial Diamond Assn. of America, Inc.—Annual meeting and convention, Mar. 13-17, Hollywood Beach Hotel, Hollywood, Fla. Association headquarters, Box 175, Pompton Plains, N. J.

Society for Non-Destructive Testing — Western regional convention, Mar. 20-24, Ambassador Hotel, Los Angeles. Society headquarters, 1109 Hinman St., Evanston, Ill.

(Continued on P. 32)

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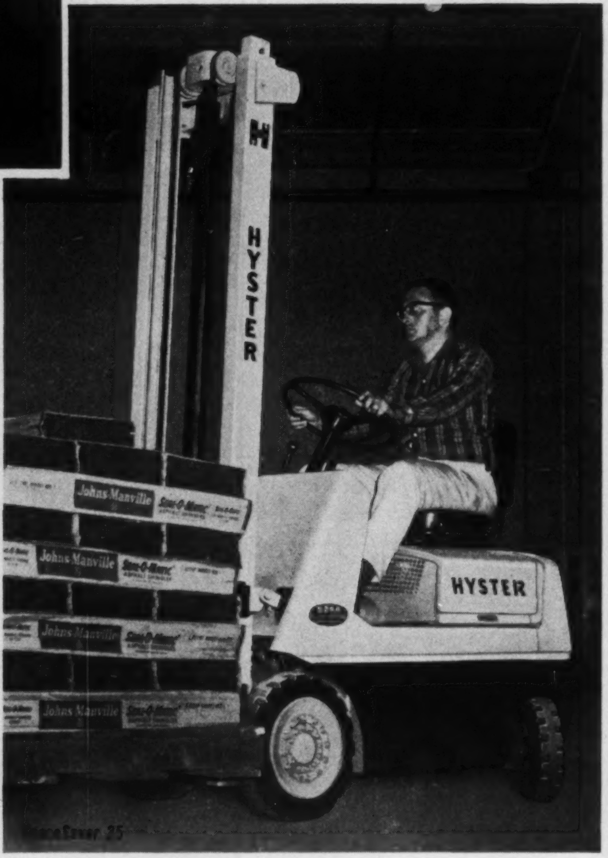
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Challenger 20	PNEUMATIC TIRES 2,000 LBS. CAPACITY
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- Highest lift—lowest overhead clearance.
- Instant access to all components that require servicing.
- Functional "human engineered" design by Henry Dreyfuss.

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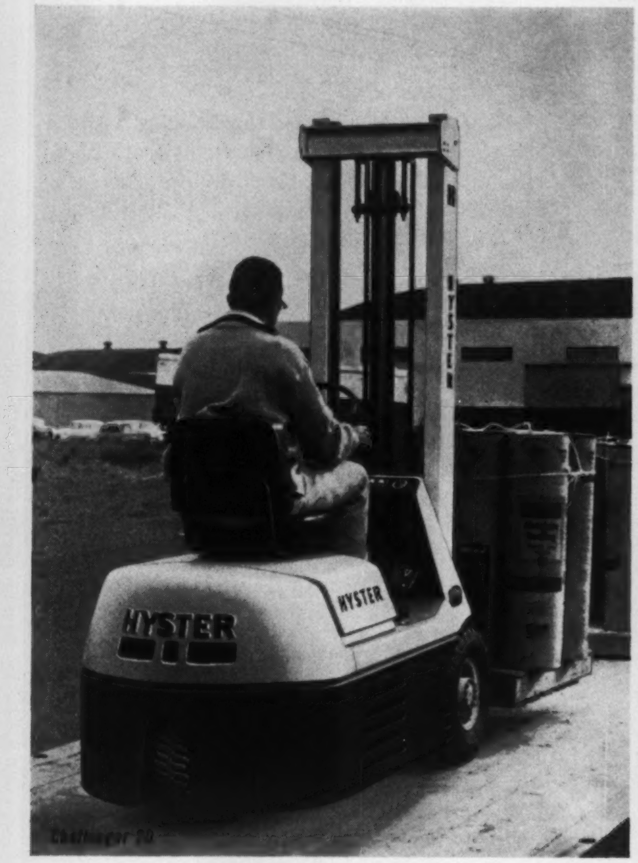
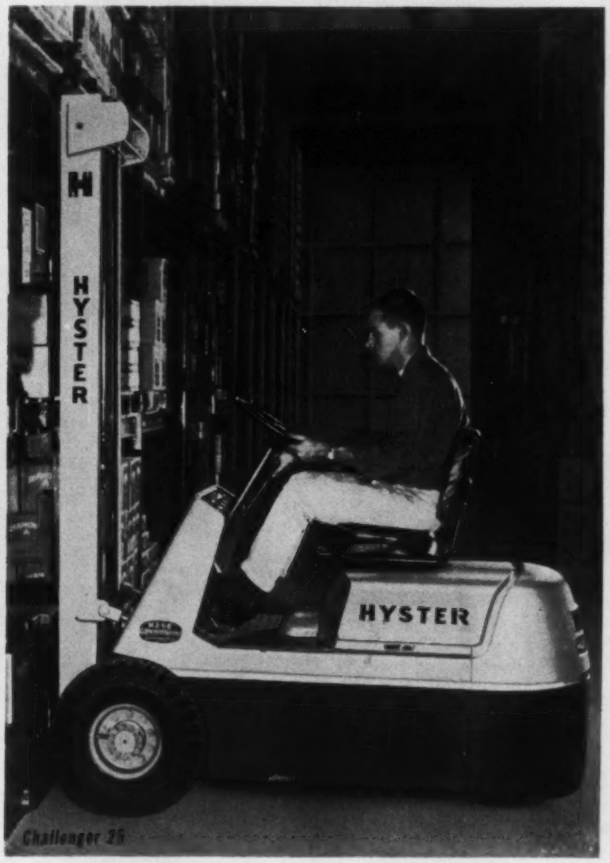
2,000 AND 2,500 LB. CAPACITIES • CUSHION AND PNEUMATIC TIRES





Builder of 2,000-lb. Pneumatics

The line that sets the *ENGINEERING PACE* for all Lift Trucks –

HYSTER has it!

You can do 10 hours' work in 8 hours with these new Hyster trucks. They are so new – so far ahead of competition that no other trucks in the 2,000 and 2,500 lb. class can come close in *driver efficiency, safety* and *ease of control, power, lift speed, service accessibility* and *compactness*. Four great trucks – cushion and pneumatic tires – with a long list of exclusive features for safer, faster, cheaper handling than you have ever known before. Call your Hyster dealer or write for literature.

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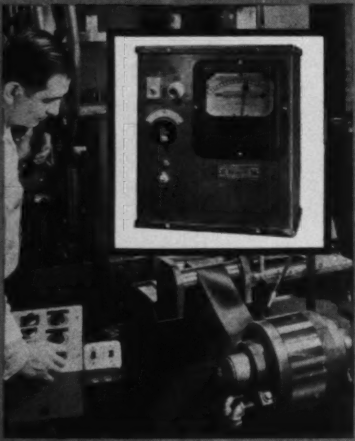

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For accuracy in dimension, physical and chemical properties on metal from .010" to .000125 thin (nickel alloys from .020"), consult Somers — over 50 years the number one source.

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MEETINGS

(Continued from P. 29)

American Hot Dip Galvanizers Assn., Inc.—Annual meeting, Mar. 22-24, The Royal Orleans, New Orleans. Association headquarters, 5225 Manning Place, N. Y., Washington, D. C.

Pressed Metal Institute — Spring technical meeting, Mar. 22-24, New York. Institute headquarters, 3673 Lee Rd., Cleveland.

Air Moving and Conditioning Assn., Inc.—Mid-year meeting, Mar. 22-24, Whittier Hotel, Detroit. Association headquarters, 2159 Guardian Bldg., Detroit.

American Machine Tool Distributors Assn. — Spring meeting, Mar. 23-25, Hotel Mark Hopkins, San Francisco. Association headquarters, 1500 Massachusetts Ave., N. W., Washington, D. C.

APRIL

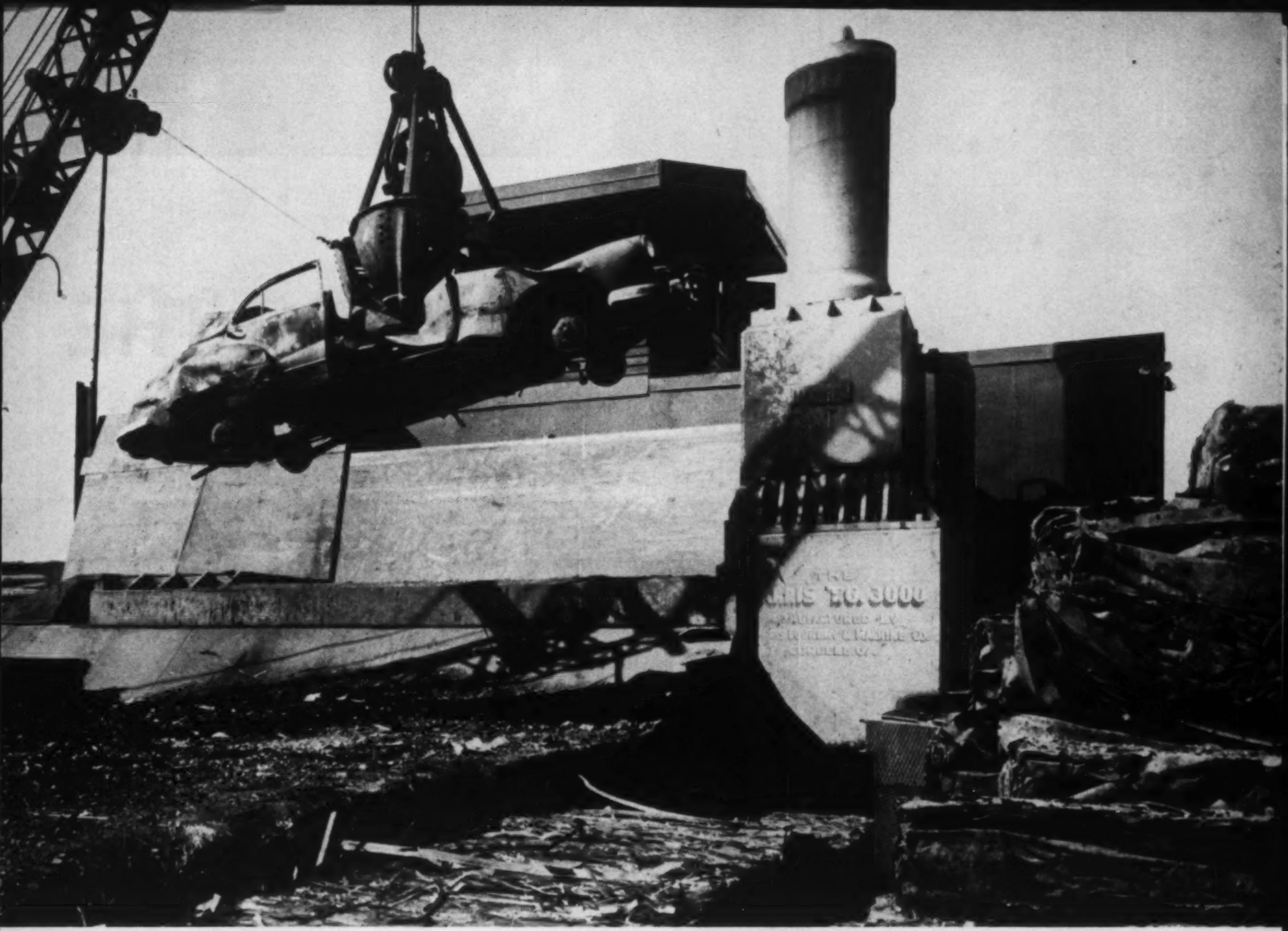
The Metallurgical Society of AIME—National Openhearth Steel Conference, Apr. 10-12, Sheraton Hotel, Philadelphia. Society headquarters, 29 West 39th St., New York.

Steel Shipping Container Institute, Inc.—Annual meeting, Apr. 11-13, Kenilworth Hotel, Miami Beach, Fla. Institute headquarters, 600 Fifth Ave., New York.

American Society of Lubrication Engineers — Annual meeting and exhibit, Apr. 11-13, Bellevue-Stratford, Philadelphia. Society headquarters, 5 North Wabash Ave., Chicago.

Copper & Brass Warehouse Assn., Inc.—Annual meeting, Apr. 11-14, Colorado Springs, Colo. Association headquarters, 1900 Arch St., Philadelphia.

Rail Steel Bar Assn. — Annual meeting, Apr. 17-18, Biltmore Hotel, New York. Association headquarters, 38 South Dearborn St., Chicago.

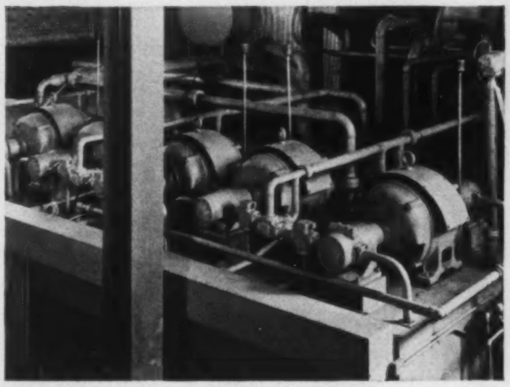


Smashing ¾ ton autos into 5 ft. bales

In a scrap salvage yard in Chicago, this huge press smashes automobiles into five-foot bales. Here's how it works. Stripped autos are shoved into a 20-foot press box. At the flip of a switch three giant plungers jam down with a force of over 1000 tons. Result: A compact bale, five feet long and two feet deep. About 30 cars an hour are run through this giant baling press.

Powering this mammoth machine requires sturdy motors. They have to deliver an instantaneous surge of power to drive home the huge plungers. Five Century Electric 100 hp motors do the job. Result: Plenty of dependable power when and where it's needed.

Century Electric application engineers have helped develop thousands of motor drive systems like this. And they can design the right drive system for your equipment because Century Electric designs, manufactures and applies motors and nothing but motors . . . your assurance of getting *more* than just a motor.



Five 100 hp Century Electric motors provide dependable muscle power for the huge press.

CENTURY ELECTRIC COMPANY

St. Louis 3, Missouri *Offices and Stock Points in Principal Cities*

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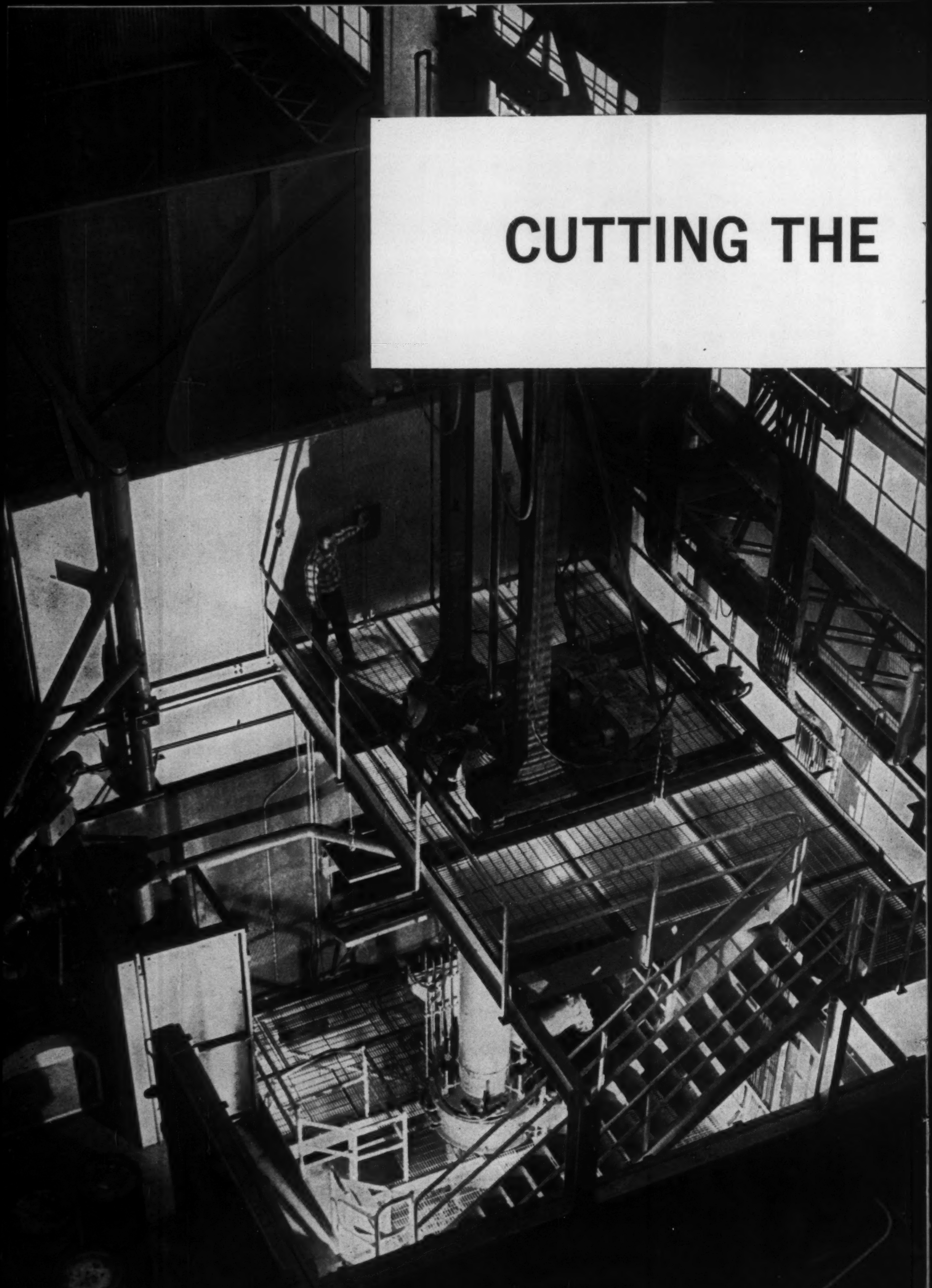

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To minimize the cost, Republic produces vacuum-melted metals in larger melts—4,000 to 20,000 pounds. Integrated facilities process 18- to 32-inch diameter ingots into a wider range of product sizes and conditions than ever before possible.

Republic's consumable electrode vacuum-melting process improves mechanical properties—tensile strength, ductility, fatigue life, and performance at high and low temperatures. Precise control reduces nonmetallic inclusions and harmful gases.

Our metallurgists will help you select and apply the vacuum-melted metal best suited to your requirements: *constructional alloy steel, high strength alloy steel, bearing steel, stainless steel, super alloy steel, titanium, or special carbon steel.* For information, contact your nearest Republic sales office or mail the coupon.

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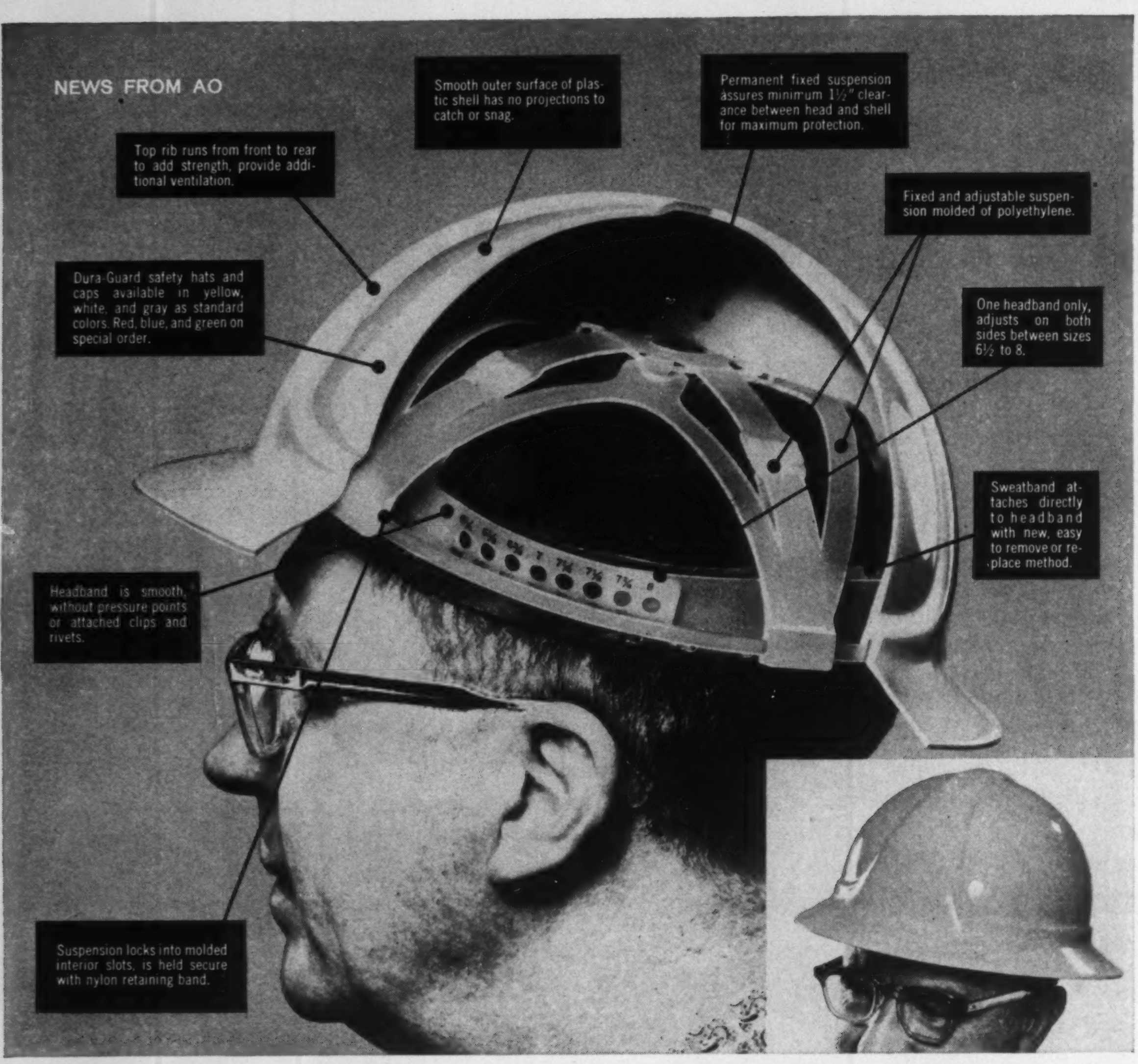

NEWS FROM AO

Top rib runs from front to rear to add strength, provide additional ventilation.

Smooth outer surface of plastic shell has no projections to catch or snag.

Permanent fixed suspension assures minimum 1½" clearance between head and shell for maximum protection.

Fixed and adjustable suspension molded of polyethylene.

Dura-Guard safety hats and caps available in yellow, white, and gray as standard colors. Red, blue, and green on special order.

One headband only, adjusts on both sides between sizes 6½ to 8.

Sweatband attaches directly to headband with new, easy to remove or replace method.

Headband is smooth, without pressure points or attached clips and rivets.

Suspension locks into molded interior slots, is held secure with nylon retaining band.

Now: one safety hat to meet all requirements

Introducing the AO Dura-Guard . . . an *all-new* safety hat designed for *universal use.* Shells and suspensions are molded plastic, without holes or metal parts. New Dura-Guard hats and caps meet or exceed all standard specifications, and *every* Dura-Guard may be used wherever dielectric protection is required. Dielectric strength in accordance with E. E. I. specifications (April 1954) is available in individually tested hats and caps.

The injection molded shell is of uniform thickness throughout critical areas. Plastic suspension and headband are lightweight, comfortable, long-wearing, nonconductive, easy to clean. Headband adjusts on *both* sides to stay centered in shell, eliminate floating. Sweatband can easily be slipped out for cleaning *without removing any other part,* is made in telescoping halves for comfort and economy. Front half, which tends to soil or wear first, can be replaced at minimum cost.

For full information, contact your AO Safety Products Representative, or write for Folder S-1456.

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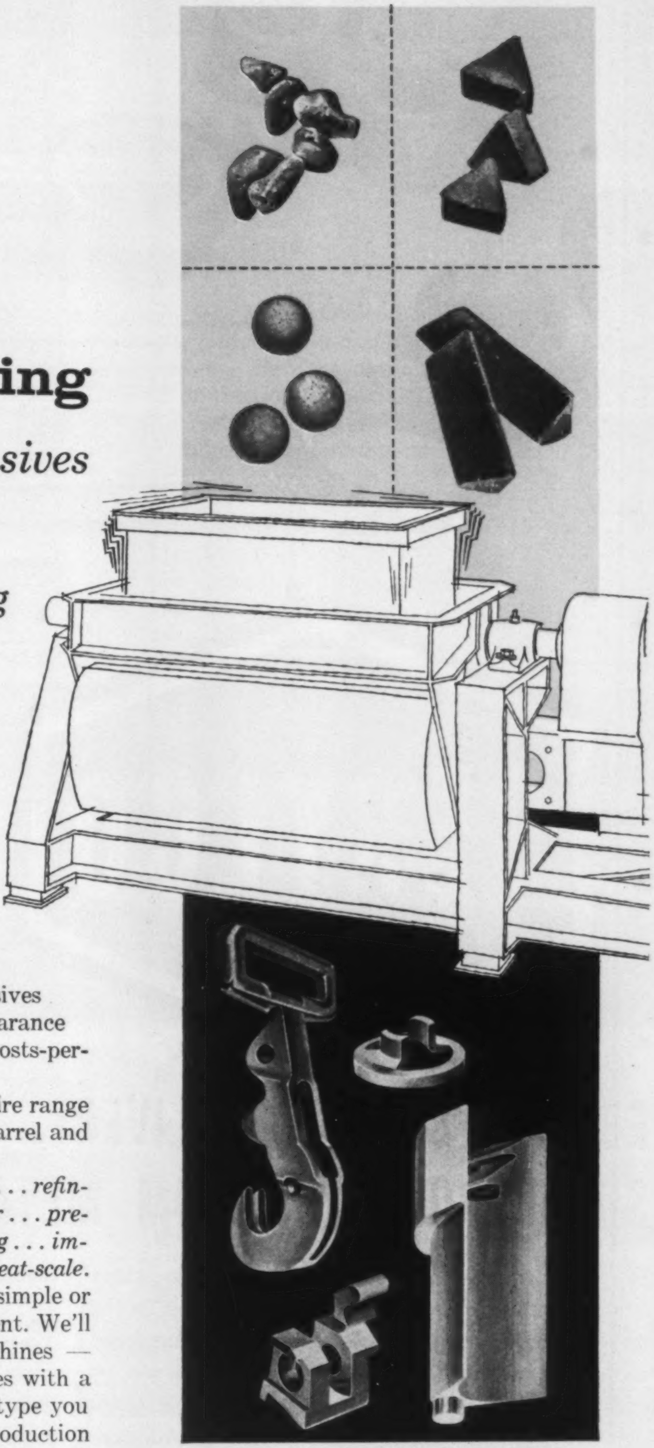
Barrel finishing is best finishing

...with TUMBLEX® abrasives

... in every type of rotating or vibratory equipment



Keeping pace with the latest advancements in barrel finishing equipment, Norton TUMBLEX abrasives are first in the field for best results with vibratory machines . . . developed for faster, lower cost finishing of the widest range of parts, especially the most complicated.

The recognized advantages of TUMBLEX abrasives help assure improved product quality and appearance — plus the fastest, easiest way to cut finishing costs-per-piece . . . by this new vibration method.

These advantages are also brought to the entire range of barrel finishing operations of both rotating-barrel and vibration types, including:

Removing burrs . . . smoothing off feather edges . . . refining surface finish . . . burnishing for luster or color . . . preparing surfaces for painting, enamelling or plating . . . imparting matte finish . . . removing dirt, grease or heat-scale.

Send your samples of parts — large or small, simple or intricate — to our Sample Processing Department. We'll barrel finish them on the most suitable machines — vibratory or rotating — and return the samples with a report on the TUMBLEX abrasives and machine type you need to improve product quality and cut production costs. NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

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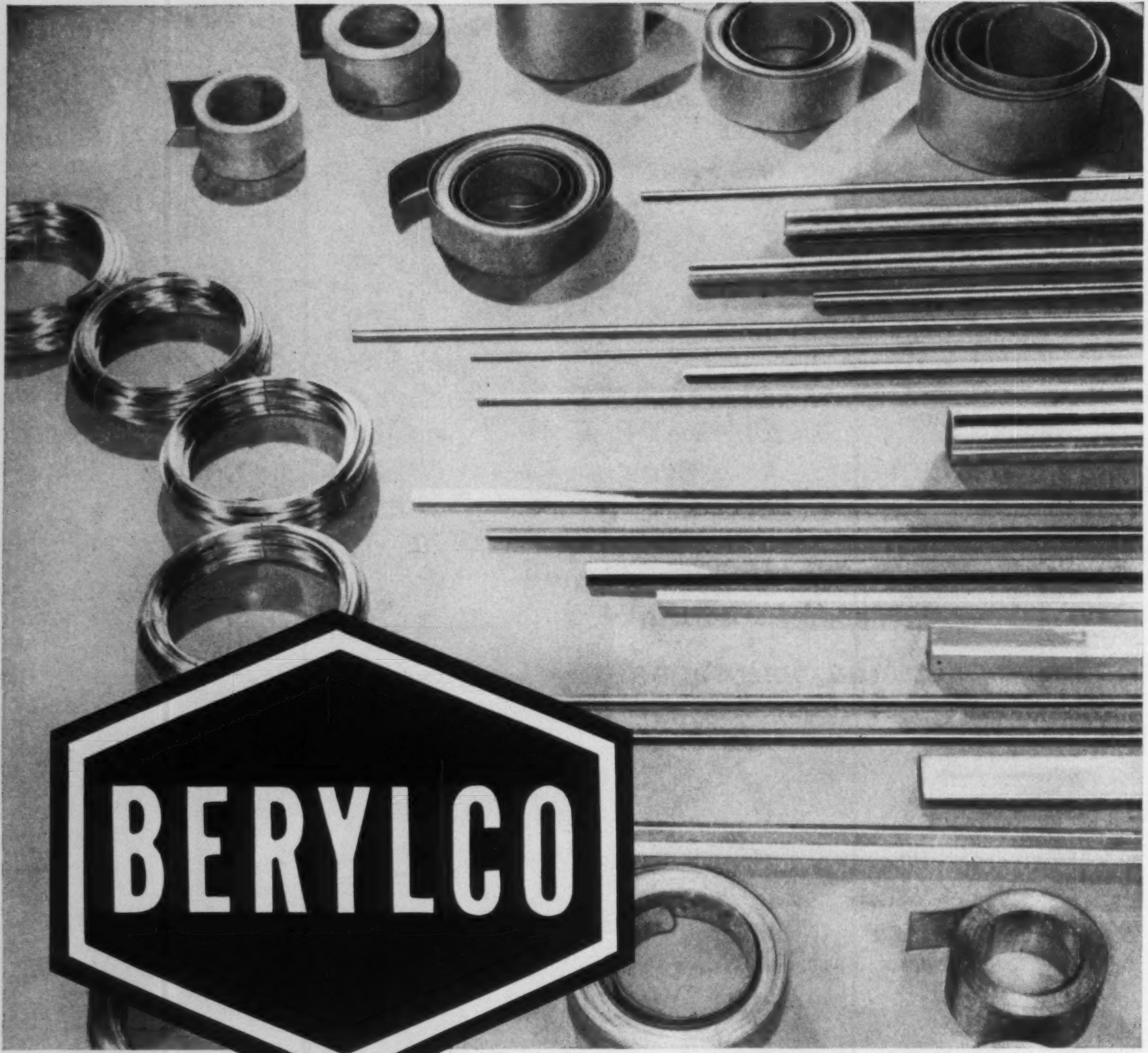

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Twenty distributors blanketing the U.S. and Canada assure you of a nearby delivery source of pure beryllium copper strip, wire, bar, rod and extrusions. The answer to many of your problems is here . . . a unique metal and alloys, outstanding technical assistance, dependable delivery. Write today for the address of your nearest distributor.

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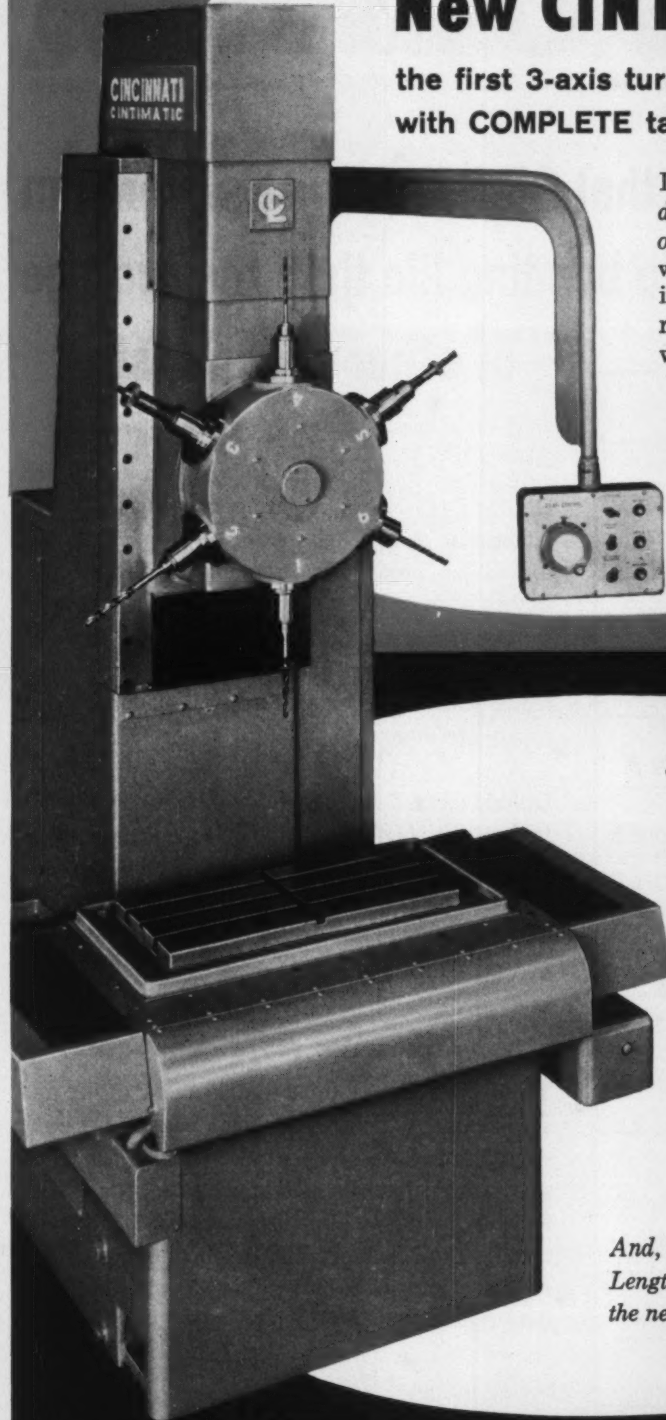
New CINTIMATIC...

the first 3-axis turret drill with COMPLETE tape control*



Drill, tap, ream, counterbore PLUS *dwell, finish bore, and light milling operations!* Here's toolroom versatility with production economies—and, amazingly fast set-up that brings the cost reductions of automation to short-run work.

Your Cincinnati Lathe and Tool Distributor will help evaluate the application of CINTIMATIC automation to your drilling jobs. Or, write for catalog.

*** Only CINTIMATIC automatically controls selection of all machining functions entirely by tape!**

- Feed selection for both turret and table
- Random tool selection from six spindles
- Automatic positioning of work table with 16″ x 30″ travel
- Multiple depth selection for each spindle
- Selection of 16 spindle speeds for each spindle
- Tap, dwell, and milling cycles

And, only CINTIMATIC *provides "Tool Length Compensator"—eliminates the need for controlled tool length.*

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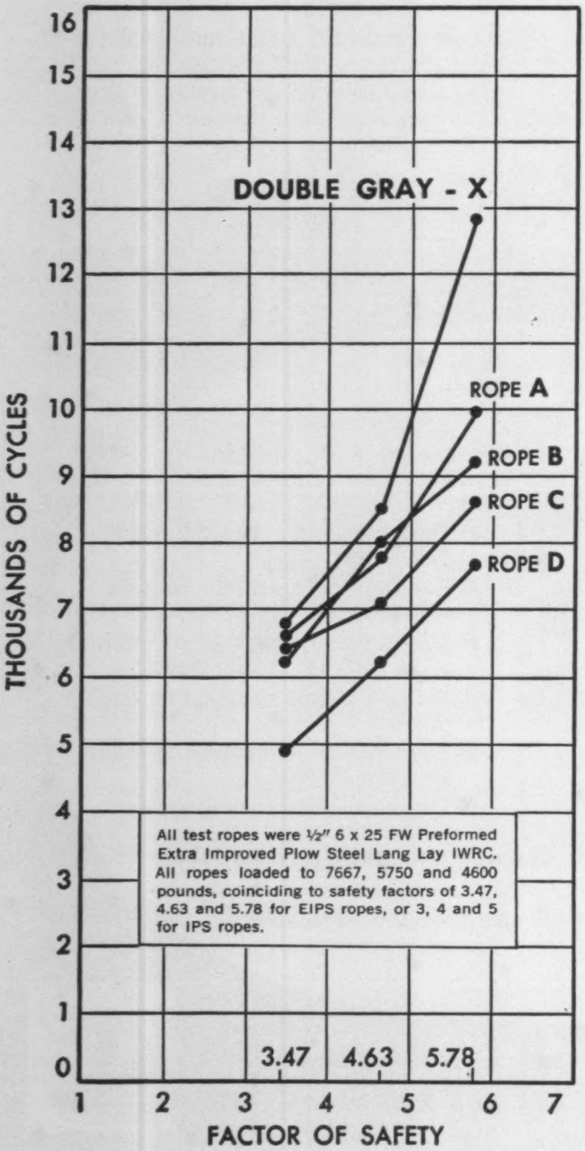
HYDRASHIFT Lathes / CINCINNATI Drilling Machines / SPIROPOINT Drill Sharpener
CINTIMATIC Numerically Controlled Lathes and Drills

DOUBLE GRAY-X®

Laboratory tests prove that CF&I-Wickwire's premium wire rope has 45%* more bending life than the average of other ropes tested



All test ropes were ½" 6 x 25 FW Preformed Extra Improved Plow Steel Lang Lay IWRC. All ropes loaded to 7667, 5750 and 4600 pounds, coinciding to safety factors of 3.47, 4.63 and 5.78 for EIPS ropes, or 3, 4 and 5 for IPS ropes.

The CF&I-Wickwire engineers who developed Double Gray-X *believed* in their product. So confident were they of its superiority that they decided to field-test prototypes of Double Gray-X as soon as they were perfected. In the months that followed, the top American firms chosen to participate in these tests delivered this verdict: when the going really gets tough, Double Gray-X lasts longer than other wire ropes.

Now, CF&I presents additional proof that Double Gray-X has *superior resistance to bending fatigue,* the chief enemy of wire rope life. In an extended series of tests conducted over the past year at CF&I's Palmer Plant, Double Gray-X proved itself superior to four other wire ropes, all made by major manufacturers.

HOW WERE THE TESTS CONDUCTED?

The five wire ropes tested—all identical in size and specification — all exceeded the catalog breaking strength of extra-improved plow steel ropes. Each rope was subjected to the same series of tests on a 25,000-pound, multiple-reeved fatigue machine, the largest of its kind. This machine punishes wire rope to destruction by bending it back and forth over sheaves.

***Percentage above average of all other wire ropes tested at safety factor of 5.78**

lasts longer

WHAT WERE THE RESULTS OF THE TESTS?

As the chart indicates, Double Gray-X lasted longer than any of the four competing wire ropes at all the safety factors used in the test. At the highest and most commonly-used safety factor, Double Gray-X lasted 30% longer than the rope that lasted next longest, and 68% longer than the rope that lasted the shortest time. Double Gray-X lasted 45% longer than the average of all other wire ropes tested at this safety factor.

WHY DOES DOUBLE GRAY-X LAST LONGER?

It lasts longer because it's the result of a breakthrough in wire-drawing technique. This new process, which includes the use of molybdenum disulphide, creates these outstanding fatigue-resistance factors in Double Gray-X:

- **A Molecular Shield** – Molybdenum disulphide creates a shield around every wire, which serves as a lubricant and prevents the wires from grinding together as the rope operates. Less internal friction results in longer rope life.
- **Smoother Wire Surface** – CF&I's new wire-drawing technique helps eliminate minute surface imperfections in the wire. This smoother surface provides better resistance to fatigue.
- **Extra Toughness** – Molybdenum disulphide lubricates the wires during the drawing process. Since less power is required and less heat generated during this operation, the original toughness of the wires is better preserved.

WHAT CAN DOUBLE GRAY-X DO FOR YOU?

It can save you money. Because Double Gray-X lasts longer on even the toughest jobs, it cuts wire rope repair and replacement costs and rope-installation time. The net result to you is an overall reduction of costly equipment downtime, and a lowering of your total wire rope investment.

As a matter of fact, those of our customers who have already bought and field-tested Double Gray-X have reported considerably longer life and less downtime on their equipment. Join these satisfied customers—try Double Gray-X on *your* equipment right away. Ask your CF&I salesman to give you complete details on these tests.

WICKWIRE
ROPE
DOUBLE GRAY-X
DOUBLE GRAY-X
A
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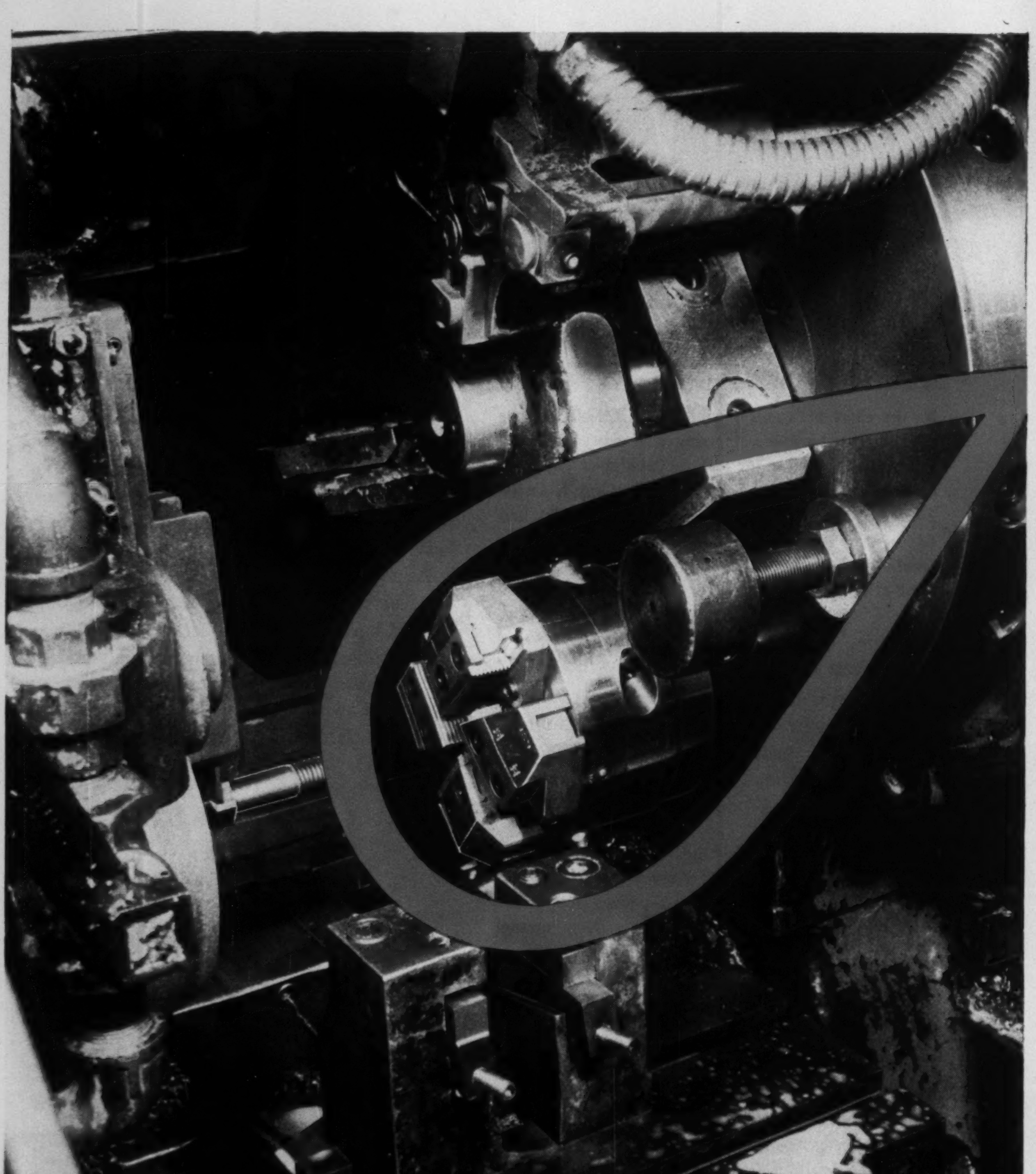
6180



AUTOMATIC THREADING

to close tolerances on single-spindle automatic

Automatic opening and closing and *ability to meet exacting concentricity requirements* were the principal reasons a LANDIS Die Head was selected to thread drive wheel cap screws for industrial lift trucks manufactured at the Yale Materials Handling Division of The Yale and Towne Mfg. Co. in Philadelphia, Pa.

⅝", 11-pitch UNC threads are cut ⅞" long on 3140 steel by a LANDMATIC Head on a Cleveland Single-Spindle Screw Machine. Threads must meet Class 3 tolerances—in addition, the threads must be concentric with the screw body within .002".

A 1-¼" FD LANDMATIC Head is being used for this work—a stationary, self-opening head arranged for automatic closing. A special over-travel feature eliminates the necessity of a complicated, accurately-set closing cam on the machine. Threads are produced to necessary tolerances at 18 SFM, with 400 pieces completed between chaser grinds.

This head, other than the over-travel feature, is a standard LANDMATIC Heat-Treated Head (primarily used for turret lathe threading) equipped with standard LANDIS Tangential Chasers. Even with this tough material, close tolerances are met with an excellent number of pieces between grinds. Further economies are realized as the chasers with regrinding will produce these threads for 80% of their original length. Wide range and oversize capacity are important features of the head—¼" to 1-¼" normal range, short thread lengths up to 2-¾" in diameter with oversize chaser holders.

A wide variety of sizes and types of LANDIS Heads allow you to gain the utmost "threading efficiency". Send us your specifications and ask for Bulletins F-80 and F-90—let us suggest the LANDIS Head most suitable for your needs.

LANDIS *Machine* COMPANY
WAYNESBORO • PENNSYLVANIA • U. S. A.

4790

SEAMLESS STEEL BARRELS and other pump components of Harbison-Fischer's rod and tubing displacement pumps show great size range required to bring oil to the surface. Pumps vary on I. D. from ¾ inch to 5¾ inches; from 3 to 42 feet in length. Harbison-Fischer counts on commercial quality Pittsburgh Seamless Mechanical Tubing to get a 4 to 6 micro-inch I. D. finish with minimum clean-up expense.

Pittsburgh Seamless Tubes Give a Lift . . .

WHEN OIL MEN MAN THE PUMPS

When the gusher quits gushing and the oil flow slows to a trickle, it's time for oil men to man the pumps.

Pittsburgh Steel Company helps give them the lift they need with seamless mechanical tubing for sub-surface displacement pumps made by Harbison-Fischer Manufacturing Company of Fort Worth, Texas.

Nine of every ten producing wells must be pumped—and most depend on slender, precision-made rod and tubing pumps for efficient oil production. Harbison-Fischer has supplied them to the oil industry for more than 25 years—"The Best Pumps in the Oil Patch."

Among its eight types and wide range of sizes, there's a Harbison-Fischer pump to match every lifting job and well condition, whether it be depth, heat, pressure, corrosion or abrasion.

Pittsburgh Seamless Mechanical Tubing forms the pump barrel that contains plungers and valves. Besides destructive conditions below surface, barrels often must bear the weight (5 to 6,000 psi) of a fluid column of oil 10,000 feet or more deep.

- **Tight Specs**—To meet rigid API standards as well as its own manufacturing needs, Harbison-Fischer requires mechanical tubing with exact chemical and physical properties, and close tolerance I. D. and wall dimensions.

It demands tubing that is exceptionally straight, free of seams, laps and pits; made of steel that is machinable, and—in the high carbon range—fine grained and hardenable.

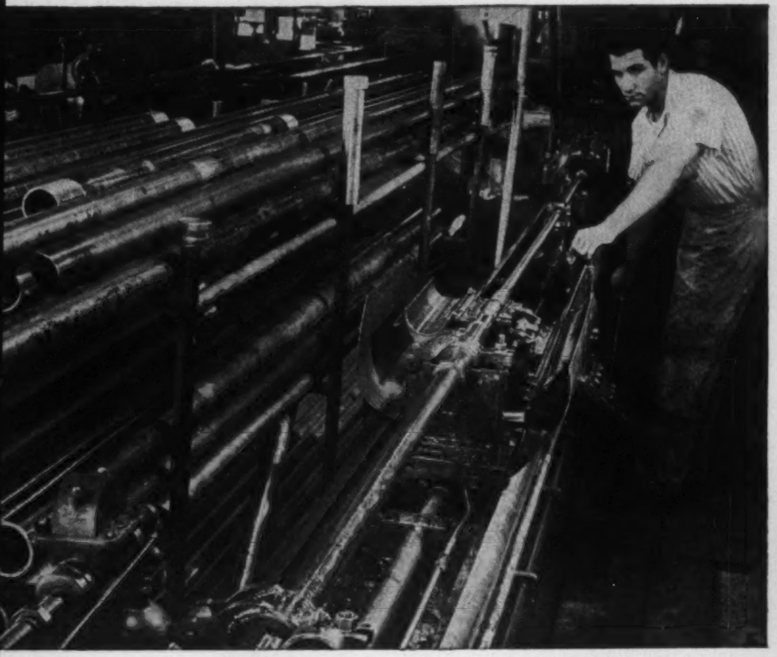
Pittsburgh Steel answers these requirements with mechanical tubing in C-1015 and C-1040 grades in commercial quality to help Harbison-Fischer hold processing to a minimum.

- **Fine I. D. Surface**—In production, Harbison-Fischer wants minimum stock removal to obtain a mirror I. D. finish and extreme straightness.

On its dozen long-stroke hydraulic hones, H-F holds the I. D. stock removal to a few thousandths of an inch. Says Harbison-Fischer:

"The honed I. D. must be entirely free of pits. We want a four to six micro-finish. So you can see why the tubing's I. D. mill finish is important."

After threading and honing, every barrel is re-straightened to a tolerance of .015 TIR (total indicator



YOU CAN BE SURE WITH SEAMLESS. Straightness, close tolerance wall thickness and absence of seams, laps and pits in Pittsburgh Seamless Tubing mean fast, easy clean-up on horizontal hones. Minimum stock removal in honing tube's inner surface results in a mirror finish. Six-foot tube being set up here will become working barrel of two-inch tubing pump.

HONED TUBE GETS RIGID INSPECTION. Inspector uses I. D. micrometer to make certain barrel of 3-inch tubing pump stays within tolerance limits of −.0000/ +.0015 inch.

PRODUCTION PERSONNEL check wide variety of tubing used by Harbison-Fischer to produce "Best Pumps in the Oil Patch" for world-wide market.

reading) to overcome distortion caused by working of the tubing.

For installations where hard pumping and hard wear are factors, Harbison-Fischer heat-treats high carbon barrel tubing by an exclusive electronic process. The process penetrates the I. D. a predetermined depth to produce exceptional wearing quality, while permitting the O. D. to remain ductile and shock resistant.

Applications such as Harbison-Fischer's are typical of the uses to which Pittsburgh Seamless Tubing is put. There are thousands of them.

If you manufacture cylindrical products or parts requiring close tolerance, smooth surface or specific physical properties, you can be sure with Pittsburgh Seamless Mechanical Tubing. It can save you time and processing costs. Contact one of the district offices or distributors listed at the right. A Pittsburgh Steel representative will show you how.

Pittsburgh Seamless Distributors

Baker Steel & Tube Company
Los Angeles, California
Chicago Tube & Iron Company
Chicago, Illinois
Cleveland Tool & Supply Co.
Cleveland, Ohio
Drummond, McCall & Co., Ltd.
Montreal, Quebec, Canada
Edgcomb Steel Company
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Gilmore Steel Corporation
San Francisco, California
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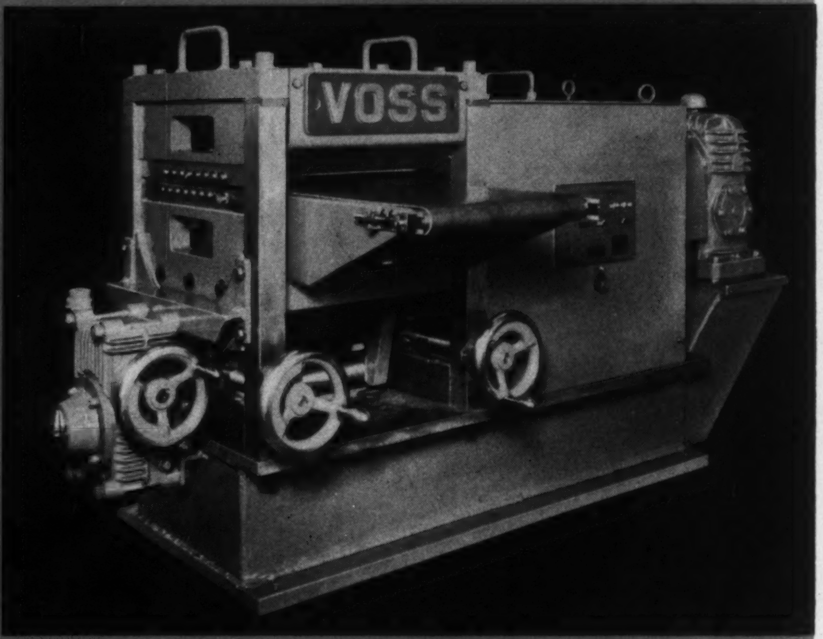

THAT'S THE STORY OF THE NEW VOSS STAMPED PARTS-FLATTENER

Stamped parts are flattened to .005 of dead flatness *in one pass!* Hand or automatic feed. Heavy duty, low maintenance. Takes no more space than your desk. Can be engineered to flatten parts with irregular surfaces. Savings in time and manpower can be enormous. Low cost for the job it does. If you're looking for cost reduction in your stamped parts operation, call or write Voss Engineering Company.

We'll be glad to arrange a demonstration with your parts, without obligation.

VOSS ENGINEERING CO.

7301 Penn Ave. Pittsburgh 8, Pa. Churchill 2-4422

(Makers of the Voss Precision Roller Leveler)

For precise atmosphere control
in metalworking . . .

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give you 3 big advantages!

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- Drying instrument air
- Metal treating and brazing
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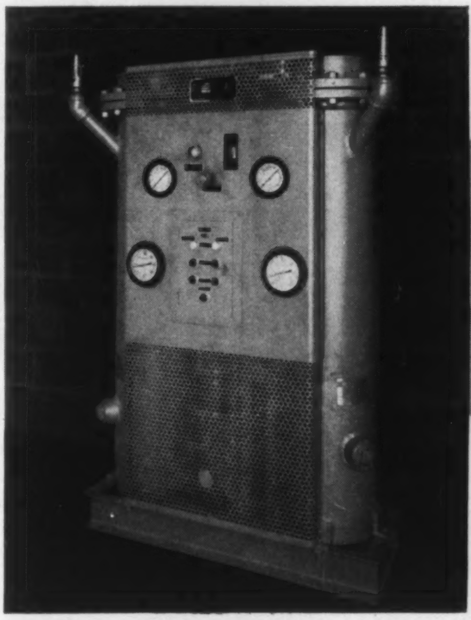
- Testing equipment



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Unequalled extra-drying power is assured with the unique 3-zone embedded heater in every Kemp Oriad Desiccant Dryer. Reactivation is always complete and uniform in drying air, gases or liquids.

2 Complete temperature control

Thermostatic control conserves heat input . . . keeps ideal temperatures for the highest operating efficiency at the lowest operating costs. The entire network is protected by an alarm circuit.

3 Complete automatic operation

Once the program timer is set, everything is regulated automatically. Drying takes place with the least loss in pressure, the lowest cost in maintenance and operation. For further information, write for Bulletin D-103 . . . or call the man from Kemp listed in the Chemical Engineering Catalog.

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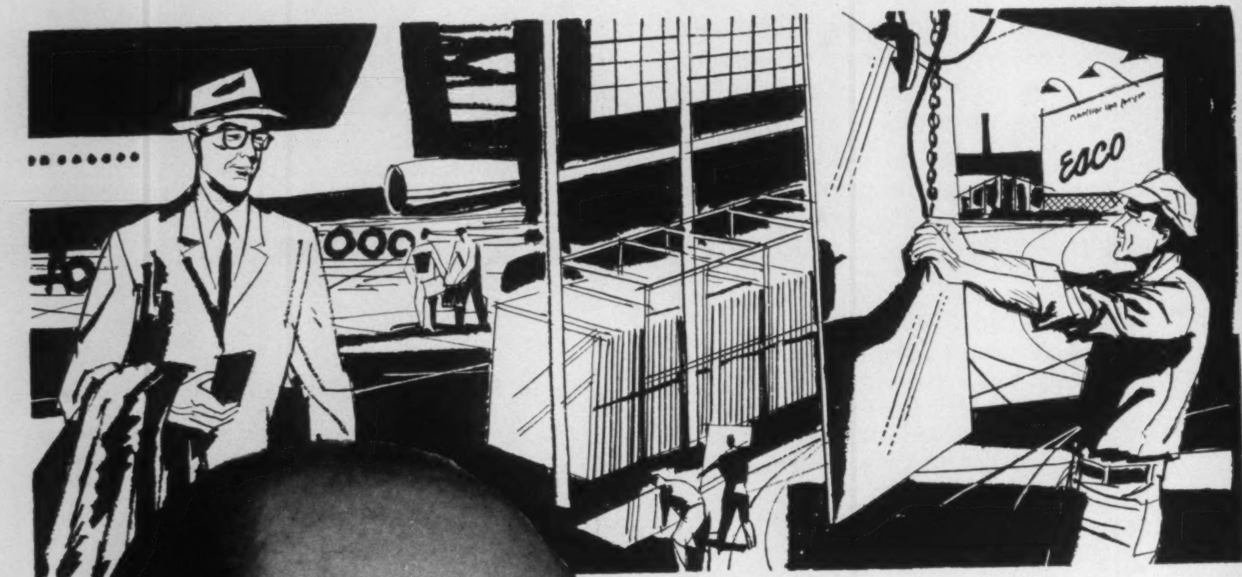
No other metal makes such a material difference in so many applications.

Bill deWeese and his



As VP in charge of Sales and Metallurgy of the ESCO Corporation of Portland, Oregon, Bill deWeese wears two hats and specializes in cutting red tape. ESCO is one of the largest warehousers of Stainless Steel in the West. Bill deWeese explains ESCO's business philosophy like this: "We're a supermarket, providing Stainless Steel service from Alaska to the Mexican border, from Hawaii to the Kansas state line. Our widespread steel service centers make it possible for us to supply orders without delay to almost any part of the country. We're specialists in Stainless Steel service and, by ordering through us, customers eliminate red tape and wasted motion trying to track down material they need."

ESCO is actually three enterprises in one —a manufacturer, a jobbing foundry and a

Stainless Steel supermarket

steel distributor. They distribute Stainless and alloy steels only. Seven ESCO warehouses (including one in Honolulu) stock a complete selection of Stainless Steel rolling mill products—sheet, plate, bar, wire, valves, pipe and tubing. In addition, ESCO produces their own brand of high alloy and Stainless Steel castings.

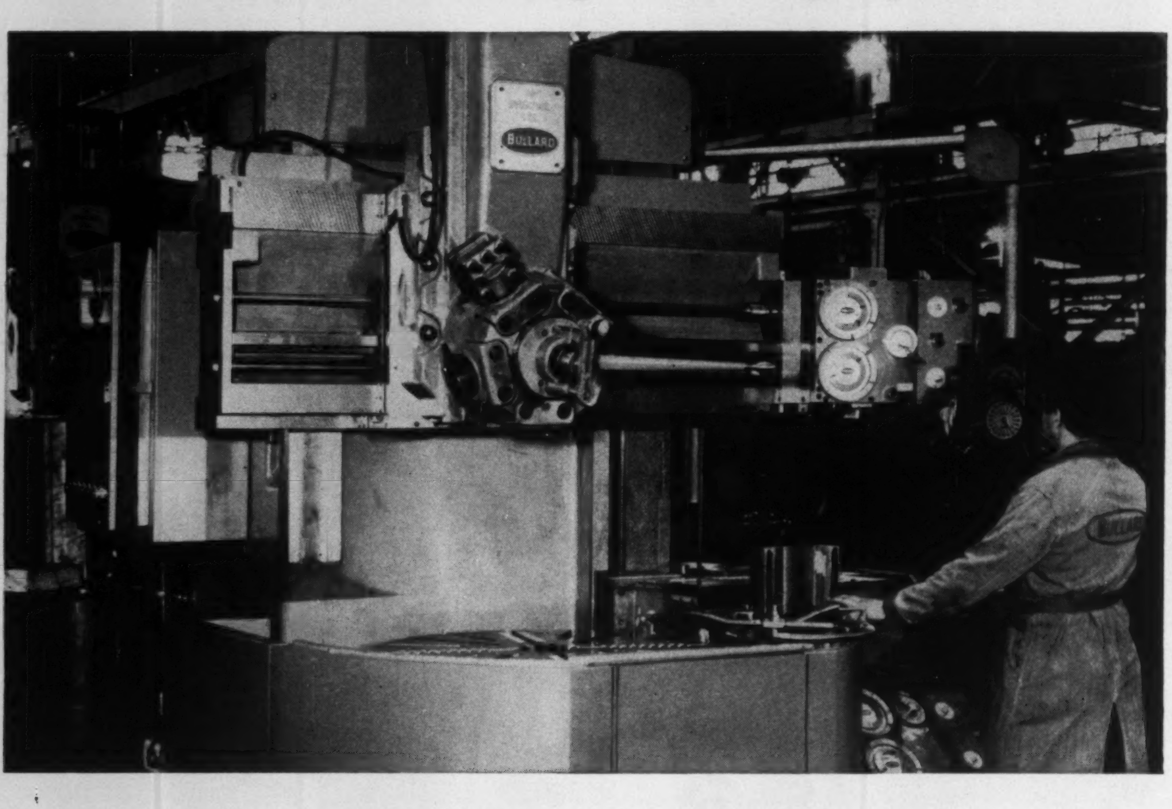
Bill deWeese isn't just an "inside man." He spends a great deal of his time personally contacting ESCO's many customers, from Honolulu to Denver, backing up ESCO's reputation for fine service. As an example of that service, here's how ESCO solved a difficult order problem for one of their oldest customers. This customer fabricates assemblies for many industries in the Pacific Northwest. Recently they received an order from a large pulp mill for processing equipment. It was to serve as a liquor cleansing unit. Because of the powerful oxidizing properties of the chemicals in pulp as it comes from the digester, Stainless Steel was required. On short notice the order moved out of inventory and was delivered on time to the fabricator.

Men like Bill deWeese, and companies like ESCO, daily do outstanding jobs in delivering Stainless Steel from steel service centers all over the country. Fabricators and manufacturers have come to depend on this reliable service, just as they rely on Stainless Steel as the ideal material where outstanding corrosion resistance, ease of fabrication, strength and heat resistance are needed. If you want unmatched efficiency, durability and ultimate economy, be sure to specify USS Stainless Steel. *USS is a registered trademark*

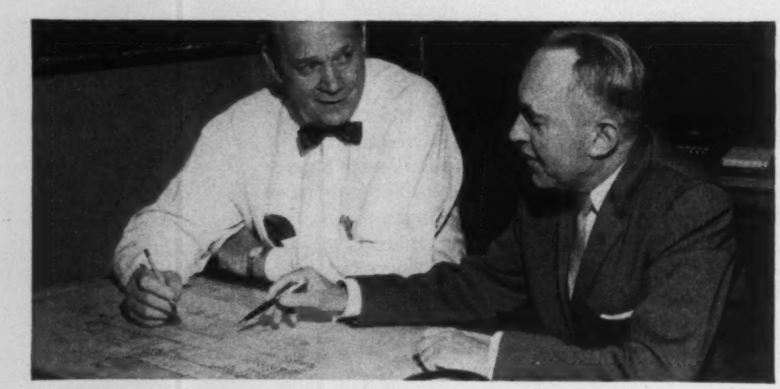
USS **United States Steel**

New Bullard V.T.L. fully powered for high production:

Has Timken® bearings for high precision



The first fully-powered vertical turret lathe, this Bullard Dynatrol® is designed to increase machine speed and output. Dynatrol provides single lever or remote control of all head motions, traverse and feed engagement. To assure precision, Bullard uses Timken® tapered roller bearings at vital points—table radial position, headstock, clutch shaft, input pulley, rail raising bracket. Their taper lets Timken bearings take *any* combination of radial and thrust loads. In the headstock, for example, Timken bearings hold shafts in proper position for smooth gear mesh and power transmission. And precision manufacture of Timken tapered roller bearings assures high precision in the machine.



ENGINEERING SERVICE THAT SAVES YOU TIME AND MONEY. Working with you at the design stage, our sales engineers can often solve your bearing problems on the spot. From the wide range of Timken bearing sizes, types and precisions they can help you select the Timken bearings to give you the maximum in efficient, economical design engineering.

Industry rolls on

TIMKEN®

tapered roller bearings

The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits. Canadian Division: Canadian Timken, St. Thomas, Ontario.

WE TAME EFFLUENTS

• • • LET US TACKLE THE ONE *YOU'RE* BREWING UP !

Here are some of the effluents tamed by 'Buffalo' Engineers and 'Buffalo' equipment:

● Coke Breeze ● Soluble gases, vapors, mists
● 1000° corrosive gases ● Metallic fumes
● SO_2 and SO_3 process gases (recovered) ● Lampblack
● Heavy dusts, rock dusts ● Tar Vapor ● Acid Mists

This is where 'Buffalo' and its half-century of experience in air cleaning come in. No matter how complicated the problem may seem, chances are that we've solved a similar one. Sometimes it's taken a lot of research, designing of new equipment, constructing pilot plants and modification—but the problem has always been solved to complete satisfaction. This wealth of information has been added to our files. And 'Buffalo' Air Cleaning Equipment has been engineered to the latest requirements of this information.

Again we say: "Toss your effluent problem to us" for the best and most economical solution in the light of 50 years' specialization. You'll benefit in "neighbor relations" and, very possibly, in valuable product recovery. Write for Bulletins AP-225, AP-425, AP-525, and 2424-F or contact your nearby 'Buffalo' representative.

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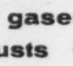
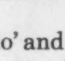
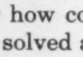
BUFFALO FORGE COMPANY
Buffalo, New York
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.



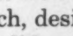
Buffalo air handling equipment to move, heat, cool, dehumidify and clean air and other gases.



Buffalo Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.



Buffalo Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.



Squier machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

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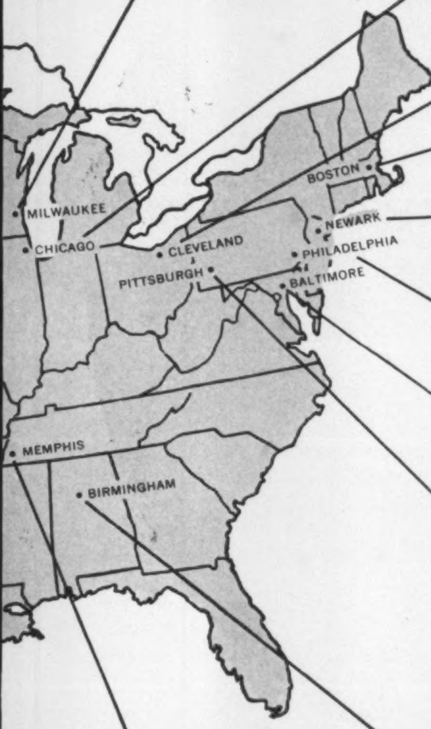

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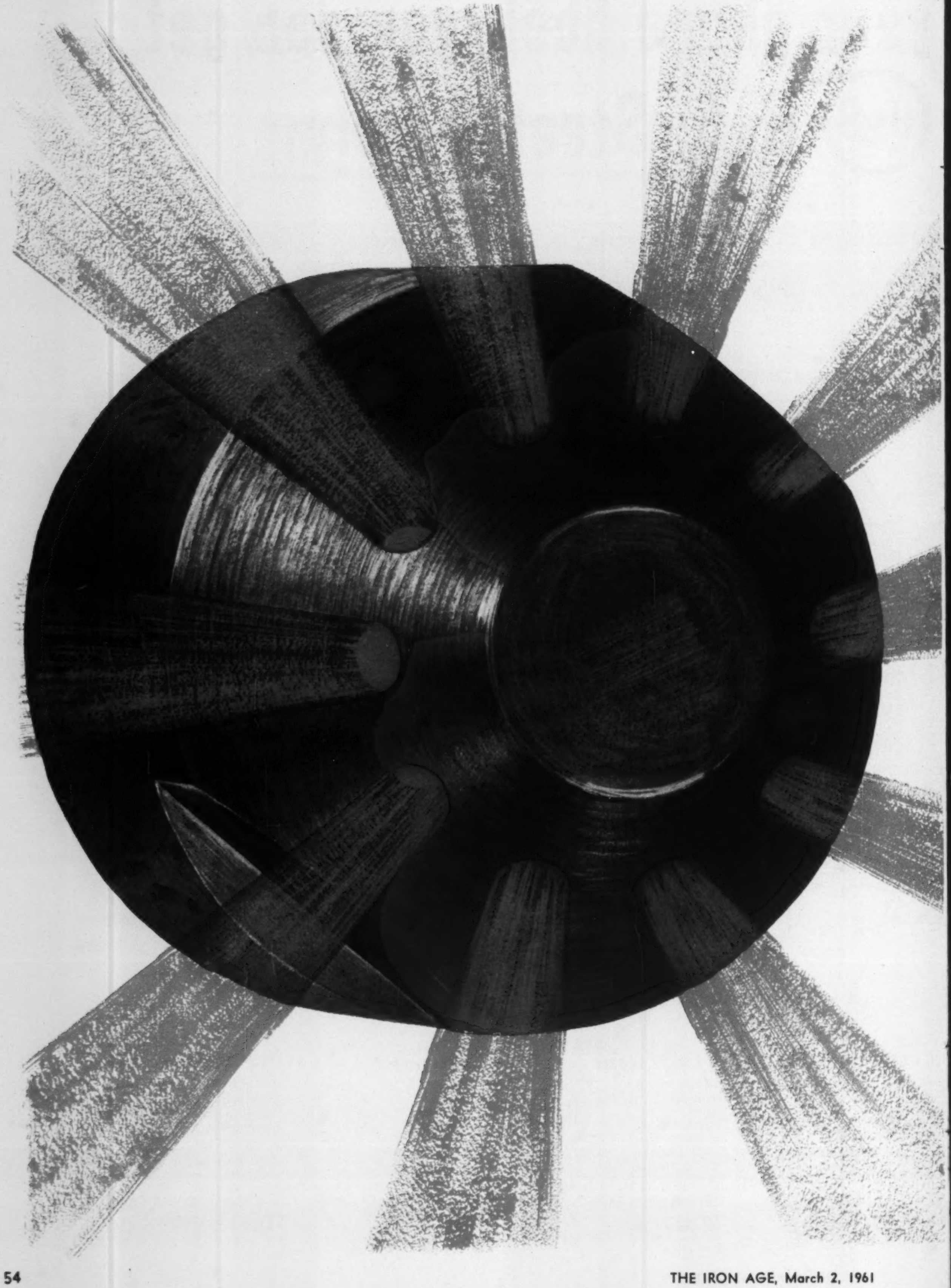
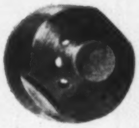


FOR THE MACHINERY PART THAT TAKES THE BEATING



Critically contoured holes in burner nozzles made of high alloy steel . . . distorted in two days. Mild steel corroded in two hours. But HASTELLOY alloy B nozzles now last several months . . . despite the punishing, high-velocity flow of steam-atomized fuel oils containing sulphuric acid, sulphur compounds, and other corrosive agents.

It's just one more example of why thousands of design and production engineers looking for tough metals for machinery parts . . . specify HAYNES alloys.

If design and production in your field demand really tough metal parts, look into HAYNES alloys. There are more than 15 to choose from, including HAYNES STELLITE cobalt-base alloys, HAYNES iron-base alloys, HAYSTELLITE cast tungsten carbide, and HASTELLOY nickel-base alloys. They are available as castings, forgings, completely fabricated parts, or as sheet and bar stock. All parts can be furnished machined or ground to specified size and finish.

HAYNES Alloys *will do the job!*

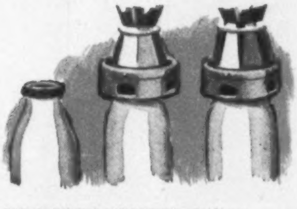
HAYNES
ALLOYS
HAYNES STELLITE COMPANY
Division of Union Carbide Corporation
Kokomo, Indiana

UNION CARBIDE

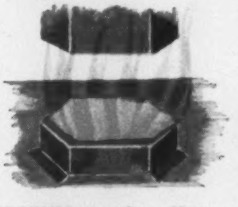
Address inquiries to Haynes Stellite Company, 270 Park Avenue, New York 17, N. Y.

The terms "Haynes," "Haynes Stellite," "Hastelloy," "Haystellite," and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

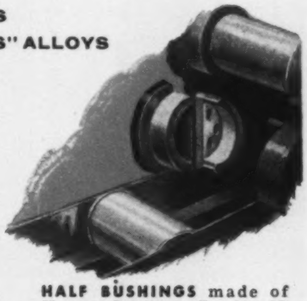
TYPICAL MACHINE PARTS OF ABRASION-RESISTANT "HAYNES" ALLOYS



MILK BOTTLE CAPPER sealing-segment fingers, investment cast of HAYNES STELLITE alloy No. 6, capped 100-million bottles in five years without noticeable wear.



DIE LINERS cast from HAYNES 93 alloy have worn only 0.015 in. while making 20,000 bricks from highly abrasive materials, far outlasting other metals.



HALF BUSHINGS made of HAYNES STELLITE alloy No. 6B are used as can headers of a machine that makes 300 milk cans a minute.

Cooked to order

... precisely

Special service, personal attention
to *every* order, regardless of size
. . . that is *precisely* the
SEAWAY STEEL policy.

The flexibility of our rolling schedules
enables us to produce any size
rod or bar to your specifications . . .
and under normal conditions,
produce it faster.

SPECIAL ANALYSIS
SPECIAL SURFACE FINISHES
SPECIAL HARDNESS
SPECIAL HEAT TREATING

SEAWAY STEEL craftsmen have
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producing quality bars and rods
for the Fastener and Forging
trades. Our vast experience and
knowledge of the requirements for
Cold Heading Quality Bars and
Nut Formations is at your disposal.

Ask us about a delivery date on your next order. ☎ NK 3-8700

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MARKET-PLANNING DIGEST

Metalworking Newsfront 6

STEEL "TINPLATE FOIL" is the next apparent entry in the steel-aluminum battle for the container market. Rumors are growing about progress by steel companies in rolling "tinplate foil" thin enough to compete with aluminum foil. At least one steel company has trial pieces of foil pans and plates.

PRODUCTS FOR TOMORROW are highlighted by J. S. Smart, Jr., new president of the Metallurgical Society of AIME. Mr. Smart, sales manager of American Smelting and Refining Co., views plastic-coated steel as a forerunner of copper-plastic composites that would be "an electrical insulator, but a good conductor of heat." Foreseeing expanded markets, Mr. Smart says electronic miniaturization is "in its infancy."

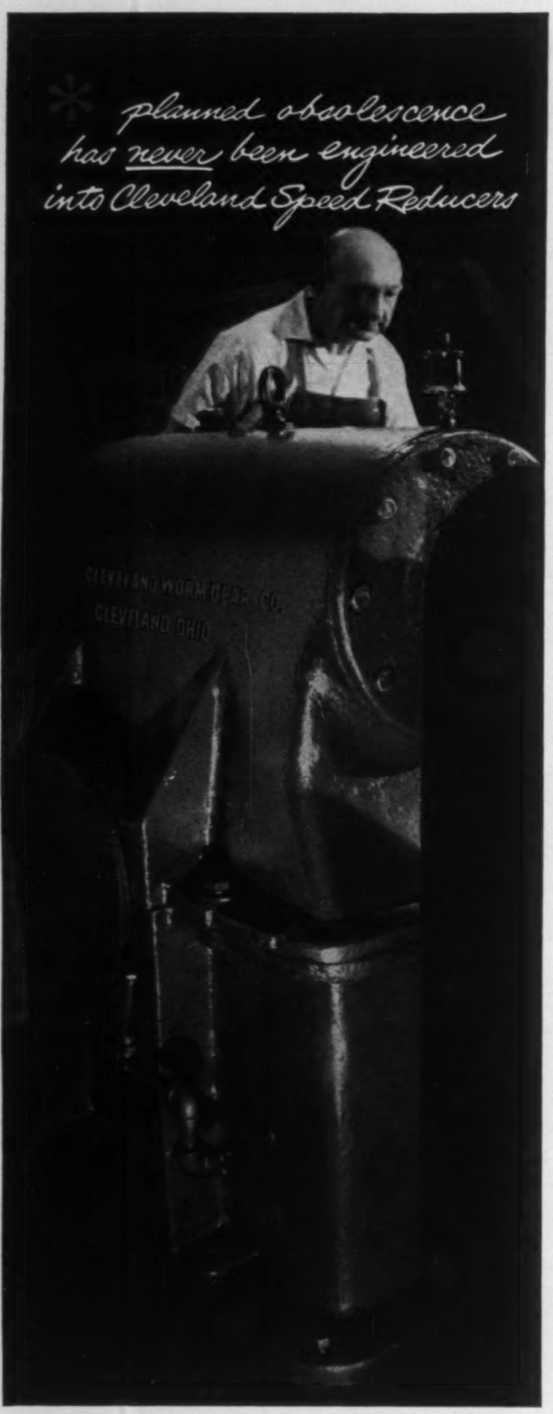
REBUILDING MARKET HITS NEW HEIGHTS and is now a $24 billion-a-year business, according to the Architectural Forum. Of this total, $4.75 billion is for residential additions and alterations; $6.5 billion for non-residential. Some $13 billion goes for maintenance and repair in both building categories.

MORE POWERFUL TRACTORS will be needed for bigger farms during the next 10 years. This is the forecast of M. D. Hill, general manager of Ford Motor Co.'s Tractor and Implement Div. He says farm size by 1970 will rise from present 290 acres to 350. Belt horsepower of the average farm tractor, now 47, will be 60 by the same year.

FACTORY SALES OF TRANSISTORS scored big gains in 1960, according to the Electronic Industries Assn. Almost 130 million transistors valued at $300 million were sold. This is a jump of some 45 million units and $80 million over 1959.

THE U.S.-CANADIAN COMMON MARKET idea is grabbing more space in the press of both countries. Also, Commerce Dept. Secretary Luther H. Hodges says he agrees with former Defense Secretary Neil McElroy that this "would come about." Advocates of the market are looking hopefully for possible overtures in Pres. Kennedy's address to the Canadian Parliament in June.

THE ELECTRIC UTILITY MARKET grows and grows. This industry spent $3.5 billion in 1960 for plant and equipment. By 1970, the industry figures it will have to spend $6.5 billion annually to keep up with demand.



In service 40 years... never overhauled!

After *40 years of continuous service* at Alcoa's New Kensington, Pennsylvania plant, this rugged Cleveland Worm Gear Speed Reducer was slated for an overhaul.

As this unit—which continuously drives a foil mill—had never been opened before, a thorough, painstaking inspection was made by Cleveland service engineers. They found the reducer required *only* a new worm radial bearing to put it in top notch operating shape. Even the gear's working face was in almost factory-new condition—after 40 years of rugged, heavy-duty operation!

As our engineers left the plant, Alcoa personnel remarked, "Well, we'll see you again in another 40 years."

We are extremely proud of this experience at New Kensington. It serves to point up our belief that building product quality and performance in Cleveland Reducers is still the main reason we are in this business. We know from experience that industry welcomes quality products—and we will *continue* to produce them.

* Today, some capital goods producers seem to be guided by the philosophy that in this age of rapid change in manufacturing methods and equipment, the resulting high rate of obsolescence does not justify the costs entailed in building long operating life into a product. This is not true of Cleveland—and never will be.

Why not talk to your Cleveland Representative and get the latest information on Increased HP Worm Gear Speed Reducers. Or write for your free copy of our latest illustrated literature—it contains the story of today's finest reducers.

Cleveland Worm & Gear Division
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CLEVELAND
Worm Gear
Speed Reducers

Buyer Push for Fast Delivery Blunts Steel Import Sales

Steel users, pushing to get rapid shipment, are bypassing foreign steel in favor of products made in the U. S.

Other disadvantages of imported steel are also helping domestic sales.

By T. M. Rohan

▪ "I'm fed up with the foreign steel market," says a wire user. "Everytime I go into it I run into delivery delays because of strikes or other problems."

His reaction is typical of many American steel buyers. In Kentucky, a distributor has resumed taking half his wire from U. S. mills rather than buy all of it overseas. A farm co-op in the Midwest switched back to American suppliers after the recent six-week Belgian dock strike. A welded wire fabric maker is again buying American because the price gap between U. S. and foreign mills is too small to make a difference.

Second Thoughts — Imports are still a potent threat to sales by U. S. steelmakers. But many consumers, long active in the foreign market, are losing interest in it. Others, who had been thinking about buying steel overseas, are changing their minds. The trend is noted by steel mills in such diverse areas as the East Coast, Cleveland, Chicago, and the Southwest.

Reasons are varied, but these are the most important: The need to get fast delivery. A narrower price differential between domestic and foreign mills. Interruptions in foreign deliveries because of strikes and other factors. Better quality products of U. S. mills. More dependable service. U. S. producers are reliable in adjusting or replacing off-spec steel.

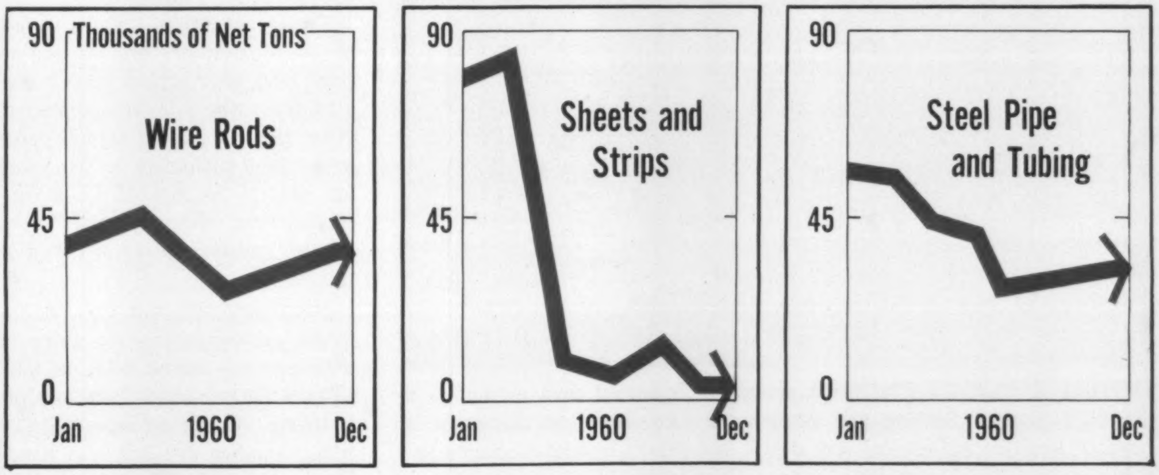
Where Trend Helps — Products most aided by this trend are those long hurt by imports: Barbed wire, nails, bars, reinforcing bars, and pipe. But other products, including plates, shapes, and sheets, are also benefiting.

Inroads of foreign plates and shapes into the U. S. have been moderate so far. But even these are likely to decline because of the present situation in construction.

"We are in a battle of rolling schedules right now," says an Ohio structural and plate salesman. "And the long deliveries from foreign mills put them at a disadvantage. Fabricators bid jobs for 60-day erection in order to get the contract. So the mills get 30 days at the very most to deliver in cut lengths from the day of the order. We have been forced into 10-day and two week deliveries. Foreign mills can't hope to compete against that, even with a price advantage."

Squeezed Out — Overseas plate and structurals are being all but closed out of Mid-west fabricating work by the fastest mill deliveries in history. They are also being com-

Can Steel Imports Maintain the 1960 Pace?



batted with some success by new, high-strength steel from U. S. mills. Revision of building codes, also helping, is a long, uphill fight.

Disillusioned buyers for special quality hot-rolled bars are coming back into the fold, according to domestic mills.

"During and after the 1959 steel strike," says a steel sales executive, "many of our users had trouble with twisted, rusted, and generally beat-up bars from overseas. This came from multiple handling on ships, trains, barges, and trucks. And the users could get no satisfaction on claims. So they wrote off 50 pct as a loss and used it up somehow. Now we are starting to get orders from these users. They need quick delivery and we can make it."

Pipe Outlook—Pipe and tubing imports into the U. S. have slipped slightly from a rate of 6.3 pct of the market during most of 1960 to about 5 pct now.

"We are having to make delivery in a day or so to get the order," a Texas pipe sales executive reports. "But we have the field stocks to do it. The Gulf area is still clobbered with imports and historically has been a dumping ground. But there are a few signs of a respite coming."

Pipe jobbers as a group have long been interested in foreign steel. The price difference between standard pipe from U. S. mills and overseas pipemakers — now about 15 pct — makes imports attractive. But, today, unless a jobber can pick up imported pipe from a "dockside" shipment, he may wait several months for delivery.

Here's what's happening, according to an East Coast pipe sales official:

Jobber Problems — "We've known some jobbers are placing long-term orders with foreign mills and short-term, rush tonnages with domestic ones. Generally, the orders are arranged so the overseas steel will arrive in plenty of time. But we get frantic calls asking for fast delivery—on sizes the jobber hasn't been buying locally."

"And when a load of foreign pipe is off quality, the mill can't replace it in a hurry, even if willing to do so. There's another case where the steel must be found elsewhere—in a hurry."

Even while buying foreign, the jobbers are not in a hurry to tie themselves completely to foreign pipe, says this sales executive. First, of course, is the basic desire to buy American, if possible. Dependable service and quality are other reasons for relying on U. S. mills. And finally there is the logical self-interest in keeping a nearby, reliable source of supply.

Wire Distributors — Across the country, distributors of merchant wire and other wire products who have been using foreign steel heavily are changing buying plans. They are placing good-sized, second quarter orders on a fast delivery basis with U. S. mills.

Some distributors are formally telling their customers they are not going to handle foreign steel products any more. Until recently distributors of barbed wire, fencing, and similar products have been getting as much as a third to over one-half of their products overseas.

During this winter they ran their stocks down to the floor and reduced re-ordering to save money. Now many are finding that foreign steel brokers have given up the trade, or are quoting deliveries as distant as one or two months.

In some cases, the price spread between U. S. and foreign sources has become too thin to matter.

An Illinois upholstery company found it was saving only $2.50 a hundred pounds on German-made spring wire. The buyer has now switched back to U. S. suppliers. A top New York broker of automatic bailing wire has been contacting U. S. mills seeking supply sources because Belgian prices are no longer favorable.

Change of Mind—"Quite a few of our distributors are starting to come back after several years," says a Midwest wire sales representative. "One sent out a letter several pages long telling customers he has given up imports because of U. S. unemployment, slow deliveries from abroad, and the closing of the price spread."

He points out the use of domestic nails increases the price of a house only about $15 or $20. "That's cheap enough insurance for a strong American industry," he adds. Another distributor is hand-

IMPORT INTEREST LAGS: Shipments of imported steel to the U. S. via St. Lawrence Seaway and other routes are now less attractive to buyers. Reasons include delivery delays and "Buy American" campaigns.

ing out cards saying, "Buy American, the job you save may be your own."

Imports coming into the Midwest have eased off since December, according to market sources there. Sales of domestic farm wire and reinforcing bar, which had been hit hard by overseas competition, have improved.

Delivery Stretchout — Importers are now less anxious to quote price and delivery dates for anything in the first half of this year. Even after the Japanese lowered their f.o.b. steel price at New York, there didn't seem to be any great spurt in import business.

Some Midwest wire mills have boosted output during the last month, as buyers laid in inventory. The mills say the increased business is partly due to reduced import competition.

In addition, the big wire buyers are on such tight delivery schedules, because of low inventories, they don't dare sign up for deliveries that would take six weeks and then might not arrive on time.

Improved U. S. Products—Product advances are another factor helping American mills. The light-gage, high-tensile wire introduced a few years ago has won customers back from foreign mills. It now represents about a quarter of the barbed wire tonnage made in the U. S. A regular 80-rod long spool of 13½ gage sells for about 15 pct less than a similar length spool of conventional 12½ gage product. Yet it is just as strong, although a little stiffer.

For the besieged wire industry, any change can't come too soon. The steel industry is one of the hardest hit basic industries in the U. S. And the wire, wood screw, rebar, and allied product fields are the worst segment of the industry.

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Humphrey: Steps down.

Carnahan: President.

Millsop: Chairman.

National Steel Corp. Gets New Team

▪ When George M. Humphrey returned to National Steel Corp. after stepping down as Secretary of the Treasury, he had specific objectives in mind for the company.

These related to markets, raw materials, and other important facets of the steel business. Now, with these objectives well in hand, he is again leaving National Steel, this time to comparative retirement.

Millsop Moves Up—He will remain as a member of the board of directors and chairman of the executive committee. But, for all practical purposes, he is leaving National Steel, a company which he helped found in 1929.

Moving up to chairman is Thomas E. Millsop. He is also chief executive of the corporation. Paul Carnahan, who has been chairman of the board of Great Lakes Steel Corp., a National Steel subsidiary, is National Steel's new president.

Officers of subsidiary companies remain unchanged.

Steel Career Men—Mr. Humphrey became general counsel of the M. A. Hanna Co. in 1917 and advanced to president in 1929. He was one of the principal organizers of National Steel through merger of Weirton Steel, Great Lakes, and assets of M. A. Hanna.

Mr. Millsop went to Weirton Steel in 1927 and in 1936 was named president of the company. In 1942 he was elected president of National Steel.

Mr. Carnahan joined Great Lakes Steel in 1933 in the blooming mill department. He advanced through operations, but was named vice president in charge of sales in 1953. He was named president of Great Lakes in 1954 and chairman in 1958.

Officers of subsidiary companies remain unchanged. They are: Wilfred D. MacDonnel, president of Great Lakes; Albert J. Berdis, president of Midwest Steel Corp.; and Charles G. Tournay, president and chief executive officer of Weirton Steel Co.

Midwest Steel just recently went into operation, shipping its first flat-rolled products in the Chicago market.

Ahead For Lead: Era of Growth

Sound Control, Nuclear Markets Spur Optimism

They differ as to degree, but producers anticipate a brighter era ahead for lead.

New markets are the key. Two holding greatest promise are sound and vibration control, and nuclear shielding.

By F. J. Starin

- Is a new era just ahead for lead?

Many in the trade say yes. Some say not quite. But all agree the future for lead hasn't looked this bright in years.

Two basic factors prompt the optimism: New markets loom large just over the horizon; and it is becoming apparent that lead has lost all the markets it is going to lose, at least for the next decade.

Promising Pair—Two promising new markets are sound and vibration control, and nuclear shielding. Right now, both are so small they are buried in the miscellaneous column in government reports.

But some top men expect these markets to be among lead's five biggest, eventually. Holding this belief are Simon Strauss, vice president of sales, American Smelting and Refining Co., and Charles Ince, vice president of sales, St. Joseph Lead Co.

Sound control itself may become lead's third biggest market, topped only by storage batteries and tetraethyl lead for gasoline.

Study Shows Way—A study by Bolt, Beranek and Newman, acoustic consultants for Lead Industries Assn., points the way in sound control.

"A sheet of lead foil about 0.008 in. thick is as effective as ¾ in. of plywood in stopping sound transmission," the reports states.

The report also claims lead is superior for door linings, machinery enclosures and to back up acoustical tile. But this market isn't limited to sheet lead. Several manufacturers are already impregnating lead into textiles, fabrics and vinyl sheets.

One lead executive figures lead for sound control will eventually average 100 lb per dwelling.

Vibration Control— Lead for vibration control usually is used in a sandwich with asbestos. There have been some dramatic applications, such as to cushion the new Union Carbide skyscraper in New York.

Nuclear Field—The other big potential market for lead is nuclear shielding.

Lead's market here is clearly for mobile reactors. It just can't compete in price with thick concrete walls and water. The consensus: Biggest tonnage for ships, with some for reactors to be shipped to out-of-the way places.

Sound Control—One lead spokesman sees sound control eventually taking about 25,000 tons of lead annually. This would put it behind such items as cable sheathing (60,000 tons), solder (60,000 tons), caulking lead (70,000 tons), and ammunition (42,000 tons). And he puts nuclear shielding several notches lower.

Other Choices—Two more market candidates are caulking lead (for joining cast iron sewage, soil and water pipe), and solder, tied closely to electronics and canmaking.

There are some who contend that other lead markets are being overlooked.

One says: "You can expect a spectacular comeback for lead lining in chemical process equipment." He bases his appraisal on the new techniques of such companies as Knapp Mills, Inc., for bonding lead to other metals, such as copper, aluminum, carbon steel and stainless.

LEAD FOR REACTOR: Lead shielding is installed in the NS Savannah's reactor containment vessel. The top section of the power plant is encased in a six-in. layer of laminated lead plates, anchored on lead wool and covered with polyethylene. The laminate of the secondary shielding is made of 3 x 6 ft lead sheets.

We're Being Financed Out of World Markets

One of the blocks in the way of expanded overseas machinery markets is difficulty of financing. However, there are some things that can be done to ease this troublesome problem.

▪ Are U. S. machinery builders being priced out of world markets? Or are they being financed out of them? On the first question you can get some argument. But on the second, the answer is less complicated.

Of course, there are many buyers throughout the world who won't pay the price for the power, engineering and dependability of the U. S.-made product.

There are, however, some foreign companies who are willing to pay for quality — but who won't go along with the terms U. S. machinery builders insist upon.

It isn't that American companies are piggish about money; it's a competitive matter: European builders, with government guarantees, can offer more attractive repayment terms. The U. S. builder can not afford to finance these sales himself and he usually can not obtain American bank financing.

So, in many cases, it isn't price that loses the order for the U. S. firm; it is the credit problem.

U. S. machinery salesmen tell of case after case where they could have landed an order at well above a foreign competitor's price—but were balked on credit terms. The German (or the British) salesman says, "Give me a week and I'll let you know what we can do on credit and terms."

The man from New England (or Cincinnati) says, "I'll have to collect a lot of facts and in about 4 months I should be able to let you know about terms."

Some people think that the Export-Import Bank should or could, solve this problem. But export managers say that the Eximbank setup is full of holes —and through these holes their overseas competitors march in droves.

These holes—or gaps in coverage of the "market" include:

(1) It is hard to interest Eximbank in loans under $100,000—where many machinery sales prospects lie.

(2) For any of a number of reasons, Eximbank may be unable—or unwilling—to lend to a specific country or group at a given time. But this may change next week and there's no way for the exporter to keep track of bank policy.

(3) Eximbank usually demands a great deal of data before deciding on a loan. It wants to see how the thing fits into the economy of the country —which takes months and costs the U. S. company a lot of money. Meanwhile, in a matter of hours the Europeans can check out the customer as a credit risk; and that's all there is to it.

In talking about this gap and the need for a bold new program to close it, C. W. Stewart, president of Machinery & Allied Products Institute (MAPI) showed how things are shifting against U. S. machinery builders.

Addressing a Senate committee last spring, Mr. Stewart cited some export-import figures. They point up a serious trend:

In 1950 U. S. imports of farm machinery were 57 pct of the value of U. S. farm machinery exports; by 1959 that import ratio had climbed to 83 pct. Electrical machinery imports in 1950 were 2 pct of exports; by 1959 this figure had zoomed to 25 pct. For machinery, the figure moved from 6.1 pct in 1950 to 16.7 pct in 1959.

President Kennedy has brought this problem into sharper focus in recent messages. In his message on "Balance of Payments and Gold" he suggests a program for export expansion and guarantees. He calls for steps to keep U. S. goods "competitively priced" with those of other countries.

While the President mentions steps to strengthen credit through the Export-Import Bank, he also wants to bring private lending institutions into the credit field on a much broader basis.

But if you look into the Senate hearings on this subject, you may be inclined to support a proposal by the New York Board of Trade. This calls for an insurance company that would be run along commercial lines. Private lending institutions would be invited to put up its capital. It would be self-supporting and would cover commercial risks itself. But, because "political" risks are more than private funds can plan for, it would have standby power to borrow from the U. S. Treasury to protect itself against losses due to actions by foreign governments.

It is to be hoped that a recommendation for an export credit guarantee corporation will soon emerge from the special study the Committee is now making. If it does, and if Congress implements it, there will be one less roadblock between U. S. machinery builders and their overseas markets.

It would seem that labor and management, Republicans and Democrats, could get together. Individuals can't compete against governments. An export credit guarantee corporation would be one step toward expanding world markets for U. S. industry.—

G. F. Sullivan

Toymakers Up Tooling Outlays

Capital Spending Increases as Toy Sales Climb

Toy sales last year hit a record $1.7 billion. And predictions are for even bigger sales in 1961.

Many toy producers will be spending more for molding and tooling equipment.

By K. W. Bennett

▪ There's money in fun and games.

The toy industry hit record levels of $1.7 billion in 1960 and will probably do even better this year. And with these gains come gains for metal producers and tool and diemakers.

For example, J. M. Besser, president, Monogram Models, Inc. told The IRON AGE his company bought three plastic molding machines in 1960 and will buy three more this year. The company spent $500,000 on design, engineering and molds for 12 models.

Monogram expects 1961 sales to reach a record $10 million.

Biggest of the model makers is Revell, Inc. This company spent $7 million for engineering and toolmaking in the past ten years.

Move Now—To the metalworker who's vying for a spot as supplier to the 2000 U. S. toy producers, now is the time to move. Gifts that will go under 1961 Christmas trees were off the drawing boards in November. The toy industry is now gearing up for its biggest production season.

Hobby kits did a $425 million retail business last year. The industry believes sales will increase five to ten pct in 1961. Hobby kit sales in 1959 totaled $400 million.

New Market—One of the newest and fastest growing juvenile markets is for electronic hobby toys. General Electric Co. recently announced its entry into this market. Heath Co., division of Daystrom, Inc. is the biggest producer in this market now, and it has only been in the race two years.

A Heath official says: "We expect to double last year's sales in 1961. We were too conservative last year in our production forecasts. We'll have to make further capital outlays in 1961."

Heath outlays in 1960 represented a 12 pct gain over the previous year.

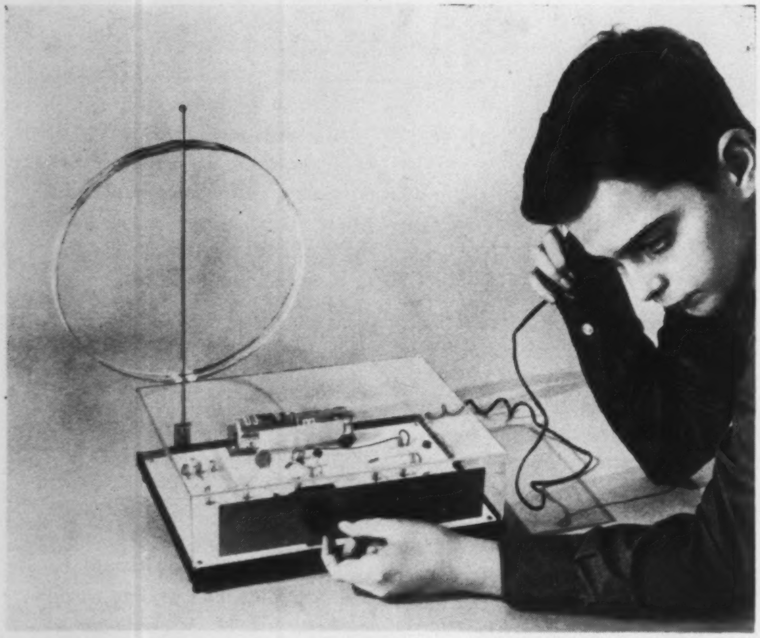
Continued Gains—Porter Chemical Co., a 48-year-veteran in the scientific toy field, already markets 30 kits for junior scientists. Now it's giving thought to producing an electronic hobby kit.

The company boosted sales 25 pct in 1959 and another 25 pct last year. They make no comment on sales expectations in 1961, but do admit "they'll go up again this year." Porter had record capital outlays during the past two years.

Toy makers don't like to think of their industry as "recession proof." They point out that profits took a beating in 1960 despite increased sales. But they admit business levels have been gaining steadily since 1957 and there's still room for more growth.

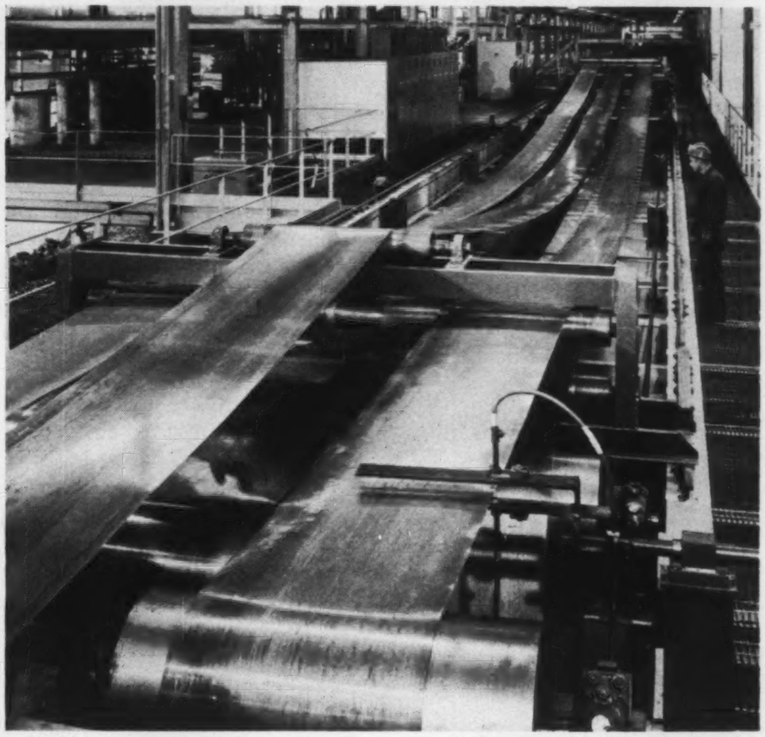
Train Sales—At least 50 million American families are buying hobby kits. Interest in mechanical and electronic "toys" is booming. Small scale HO model trains, for instance, only began to catch on five years ago. In 1960, the industry marketed a record 1 million sets of the tiny trains.

While there's been considerable talk about imports hurting the U. S. toy industry, Revell points out the foreign toymaker is being hit hard in his own home market. Only 2 pct of U. S. toys are imported.



BIG MARKETS: The toy markets continue to grow and hit record levels. Electronic hobby toys are among the fastest growing juvenile markets.

New Normalizing Line Boosts Output



NOW OPERATING: This is part of the new 1040 ft continuous normalizing line for processing high-grade, grain-oriented silicon electrical strip steel at the Bagdad, Pa., addition to the West Leechburg Works of Allegheny Ludlum Steel Corp. It substantially boosts normalizing capacity.

Defense Speedup Adds $2 Billion to Budget

The Kennedy Administration's defense speedup plans will add more than $2 billion to the $41.8 billion military budget now slated for 1962.

The speedup plan, based on reports from a number of Pentagon task forces, was scheduled to go to President Kennedy this week. First submitted to Defense Secretary McNamara, the plan calls for speeding up missile production, increasing the number of jet bombers kept on alert, and expanding conventional armed forces for limited and global war.

Specific proposals include: Expansion of forces for Korea-type limited wars; a new production line for Minuteman missiles; speedup of Atlas and Titan missile base construction; stepping up the bomber forces airborne alert system; and new funds for the Skybolt missile.

Fast Buying, Building—The Defense Dept. also has taken action to speed up the 1961 procurement and construction program.

Secretary McNamara ordered initiation of plans for awarding certain construction and procurement contracts two to three months in advance. These plans involve available funds of $650 million for procurement and $40 million for construction.

If Congress enacts new spending plans before April 1, it may be possible to accelerate $500 million worth of construction projects originally scheduled for fiscal year 1962.

$6 Million Plant Set For Oxygen-Nitrogen

Air Products, Inc., is building a $6 million oxygen-nitrogen plant at Sparrows Point, Md. It will supply Bethlehem Steel's Sparrows Point Works with 450 tons per day of high purity nitrogen and 350 tons per day of high purity oxygen.

Allied Chemical Corp. will build one of the largest tar distillation units in the U. S. for the Bethlehem works. It will recover chemicals from coke-oven tar for processing in Allied's Philadelphia facilities. Capacity of the new plant is 50 million gallons of tar per year.

Buildings May Travel In Army Barrels

If studies now being made by U. S. Army Engineers at Fort Belvoir, Va., work out, the military will be shipping some of their buildings in barrels.

The plan is to ship barrels of liquid plastic to construction sites were it would be treated to form a rigid building material of foam.

The Army calculates it can get 30 cu ft of material for each cu ft of liquid plastic. Cost is about $1.50 per cu ft of 1.8 lb per cu ft density foam.

Statistics are based primarily on an experimental building the engineers have already constructed. It is 16 ft wide, 24 ft long, 9 ft high, and weighs 552 lb. The plastic from which it was fabricated could be contained in one 55-gallon drum.

The building is panel type, with each panel foamed into place in molds. The Army says it can be reinforced in many ways, but the most likely is polyester or epoxy fiberglass resin spray.

Advantages, besides ease of construction, include low thermal conductivity and moisture absorption.

West Coast to Get Aerospace Building

A seven-story Aerospace Center, first building designed for aerospace industry tenants, will be built at El Segundo, Calif., near Los Angeles International Airport.

The $2.5 million steel and concrete facility will feature roof-top and auxiliary ground heliports, high-speed electronically operated elevators and parking for 450 cars.

INDUSTRIAL BRIEFS

Presses Apart — Arnhold Ceramics, Inc., has formed a subsidiary, AC Compacting Presses, Inc., which will take over operations of the company's Dorst Division. It will have exclusive U. S. and Canada sales and engineering control of Dorst presses.

Florida First—Metal & Thermit Corp. opened its new $500,000 detinning plant in Tampa, Fla. Other new plants are planned for Hamilton, Ont., and Portland, Ore.

Plant for Park—George A. Fuller Co., New York, will build a new $5 million plant for the W. S. Tyler Co., Cleveland. The one-story steel frame structure, located in the Mentor Industrial Park, 25 miles from Cleveland, will produce heavy wire cloth and vibrating screen machinery for industry and mining.

Kaiser Running—Full production has been reached at Kaiser Aluminum & Chemical Corp.'s new coke-calcinating plant in Gary, Ind.

Building Begins — The Harvill Corp., Los Angeles, has started building its new $1.3 million die cast manufacturing facility at the Rancho San Pedro industrial area near Compton, Calif.

Bay State Builds — Industrial Stainless Steels, Inc., had Massachusetts Governor John A. Volpe turn the first sod for its new 40,000 sq ft facility at Cambridge. Industrial is a subsidiary of Eastern Stainless Steel Corp., Baltimore. It also opened a warehouse in Buffalo.

Five-Year Plan—Michigan Plating & Stamping Co. is near the end of its five-year, $1.5 million expansion program. Latest equipment installed at the Grand Rapids facility is a giant 1000 ton press.

Name Change — The National Ornamental Iron Manufacturers Assn. changed its name to the National Metals Manufacturing Assn. at the annual convention. Officers elected include John W. Brown, Atlanta, Ga., president; Vernon M. McFarland, Willoughby, O., and Al Butlak, Buffalo, vice-presidents; Melvin Peterson, Wasco, Ill., secretary; and James Kathman, East St. Louis, Ill., treasurer.

Power Crane Posts—Lewis C. Black, South Milwaukee, was elected president of the Power Crane & Shovel Assn. Other officers are Hugh B. Halloran, Manitowoc, Wis., vice-president; Herbert S. Blake, Jr., secretary, and Donald V. Reed, treasurer, of New York.

Milwaukee Honors — Herman Williams, president of the Williams Steel & Supply Co., Milwaukee, was named "Warehouseman of the Year" by the National Assn. of Steel Distributors.

Builders' Best—H. E. Lore, the Dravo Corp., Pittsburgh, was elected president of the National Constructors Assn. He is manager of Dravo's engineering and construction department. George Collins, of the Lummus Co., New York, was named vice president.

Wholly-Owned — Wilson Bros. has acquired the remaining 50 pct of the stock of Parallite Mfg. Co., Export, Pa. The new wholly-owned subsidiary will be moved to the 260,000 sq ft facility of Houze Glass Corp., Point Marion, Pa., centralizing two fiberglass facilities.

Tract for EDP — Minneapolis Honeywell's Electronic Data Processing Div. has purchased 48 acres of land in the Boston suburb of Billerica. A 75,000 sq ft manufacturing plant will be built.

NUTS
PARTS DEPT.
NUTS
NUTS
DAWSON
IRON AGE

"Don't be silly, Charlie . . . nobody thinks any such thing!"

Ohio Buy — Chromalloy Corp., New York, has acquired Shunk Mfg. Co., Bucyrus, O., producer of replaceable blades and cutting edges for heavy road equipment. It will be operated as a wholly-owned subsidiary of Chromalloy.

Trackwork Pact—Midwest Steel Corp., Charleston, W. Va., has purchased the trackwork division of the H. K. Porter Co., Inc., Huntington, W. Va. Included in the deal are all machinery and inventory used in the manufacture of "West Virginia" brand railway trackwork.

Hospital Move — Fairbanks, Morse & Co., Chicago, has acquired a majority interest in Disposable Hospital Products, San Francisco.

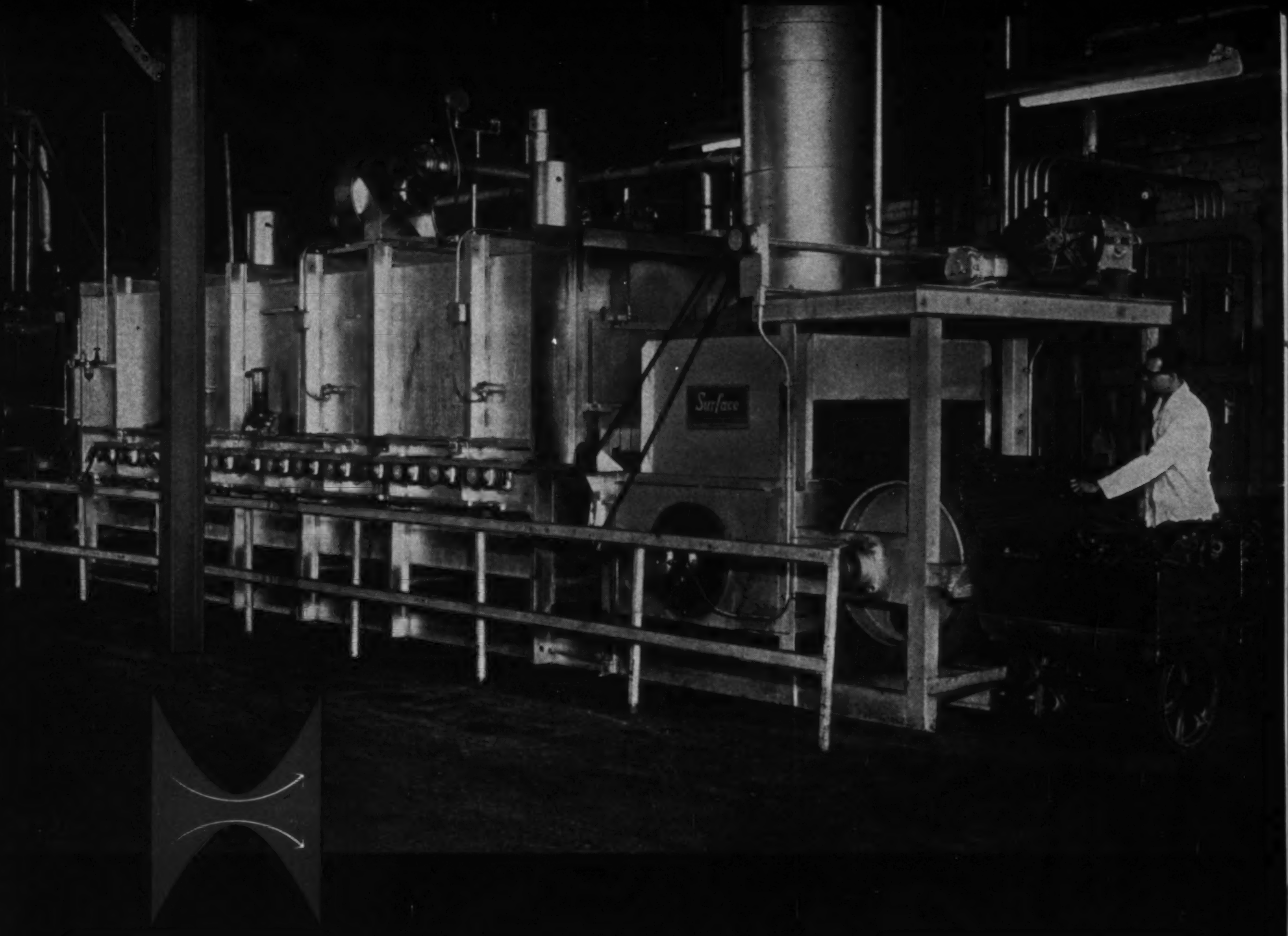
West Coast Growth—Keystone-Seneca Wire Cloth Co. has bought a new building at Fullerton, Calif., to produce insect wire screening. The plant will be the headquarters of the company's western division.

Siegler Merger—Jack & Heintz, Inc. Los Angeles, has merged into The Siegler Corp. It is now a division of Siegler, manufacturer of military and commercial electronics and aerospace components.

Annealing Addition—Fairmont Aluminum Co., Fairmont, W. Va., is installing a gas-fired annealing furnace. It's part of the company's $10 million plant expansion and modernization program.

Houston Opening—A new warehouse was opened in Houston by the H. M. Harper Co., Morton Grove, Ill. It will service Texas, Oklahoma and Louisiana customers with non-ferrous and stainless steel fasteners.

Open House—Huron Steel Co., Inc., Detroit, held an open house to mark its move to new steel warehouse facilities at 17900 Ryan Road. Visitors saw the latest steel storage and processing methods.



SURFACE POWER CONVECTION EQUIPMENT

cuts Ross Gear forging process time 50%

High speed, high volume air circulation is the feature of this Surface continuous draw furnace, which enabled Ross Gear and Tool Company, Lafayette, Indiana, to

(1) process a wide variety of steering gear forgings much faster than with the batch type furnaces replaced. These forgings range from a few ounces to 22 pounds.

(2) draw forgings at rates to keep up with production in hardening operations.

(3) reduce handling operations, consequently reassign personnel to more productive jobs.

The furnace has three separately controlled zones, each with its own burners and fan. The uniformity of furnace temperature from zone to zone is consistently held within ±5°F.

Mr. Leonard Ewalt, Chief Metallurgist of Ross Gear, reports: "The furnace will heat through a 2-inch section in approximately 40 minutes—just about as fast as the metal can take it when heated by convection . . . I would say that with this method of distributing heat in the zones and the rapid heating rate, this Power Convection furnace* is a couple of years ahead of its time.

We're not waiting for tomorrow, either. We're getting results today."

Write for bulletin SC-182. Surface Combustion, 2373 Dorr Street, Toledo 1, Ohio. In Canada: Surface Industrial Furnaces Ltd., Toronto, Ont.

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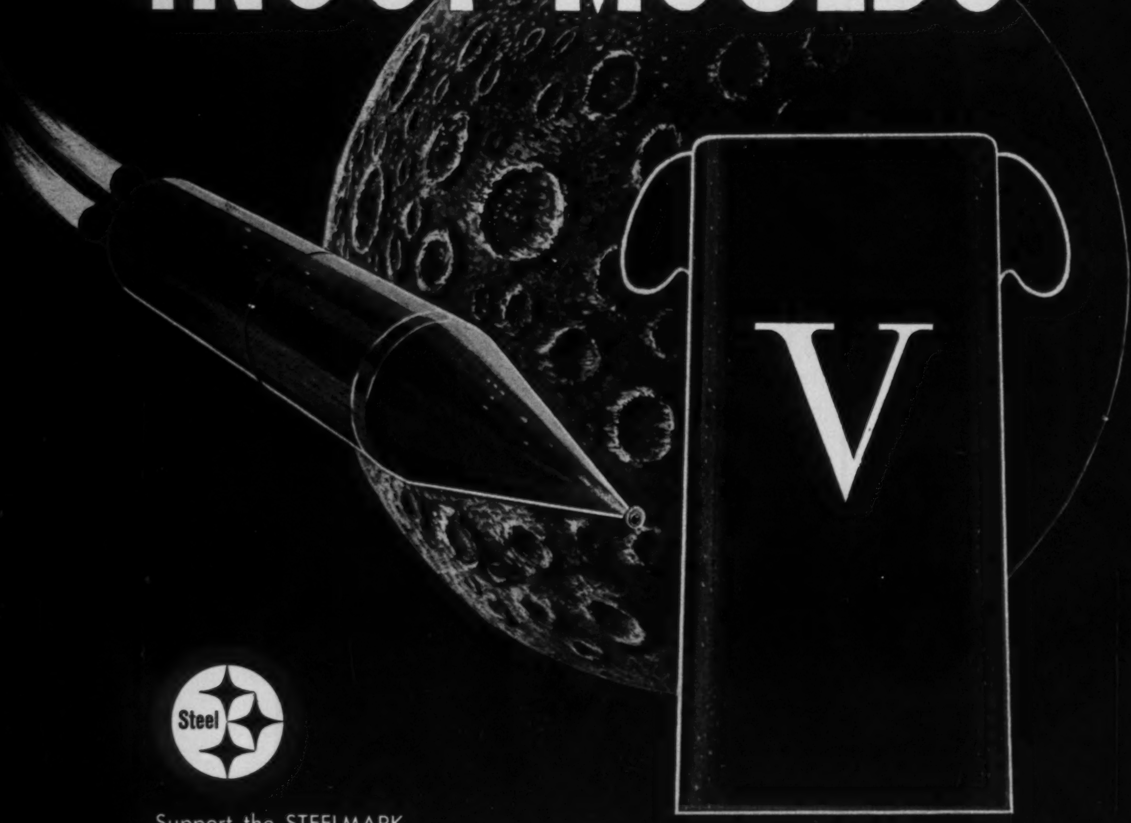

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What Changes Buying Patterns?

Greater spending for services is only one part of the post-war switch in consumer buying habits.

Many new developments are interacting to revise markets drastically.

▪ You don't need to be reminded the consumer is important. Even if you only sell capital goods, his buying patterns influence your sales.

There's been a violent upheaval in consumer tastes and trends in the post-world War II period. Noting this, the government began surveys last week designed to bring its Consumer Price Index up-to-date. (See IA, Feb. 23, p. 71.)

One of the trends which will show up clearly is the increase in spending for services. But the changes in consumer thinking go deeper than that.

More Complex—Says the Federal Reserve Bank of Philadelphia in its monthly business review: "Consumers are more sophisticated and have more complex wants. They are more choosy and harder to please. They are interested in real value and will pay to get it. . . . Aside from the broad drift to services, no clear new consumer pattern has emerged. Instead there seems to be a churning of trends—a kaleidoscope of demands . . ."

The Bank then charts some of the changes—psychological, sociological, and economic—in the post-war consumer market. They include:

Less Unit Spending: The early post-war market was fairly unified and predictable. Families tended to spend as units. Now the members spend more as individuals. Youngsters, if they do not actually spend, have greater influence on what is bought. In short, the market has begun to atomize, splitting into many independent markets and submarkets.

More Discretionary Spending: Consumers now have more income to spend after taking care of the essentials—food, clothing, and shelter. The National Industrial Conference Board estimates discretionary income has risen 64 pct since 1956.

"Split-Level" Selling: The many "separate" consumer markets make selling difficult. Many products don't appeal to all groups. One example is the automobile. "There's now a car for every purpose and purse." In addition, many buyers want two or more of such items as TV sets, radios, telephones, cars, appliances, and, possibly, houses.

Buyer Goals: On the one hand, there are forces at work molding consumers into one, uniform buying mass. However, this influence is resisted. The buyer still attempts to be an individual by buying original art or handmade furniture. He spends more on culture. He budgets more for the education of his children.

Steel Output Index Analyzed

▪ The move junking the steel industry's operating rate is criticized by the Pennsylvania Business Survey of Pennsylvania State University.

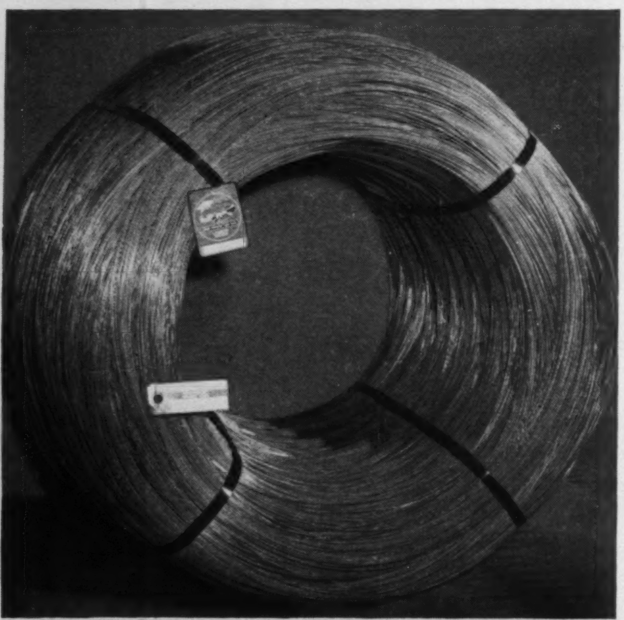
Says the Survey: "The decision to stop releasing capacity-in-operation figures was apparently based on the feeling the data created too pessimistic a view. However, substitution of index number may be criticized as giving too optimistic a picture.

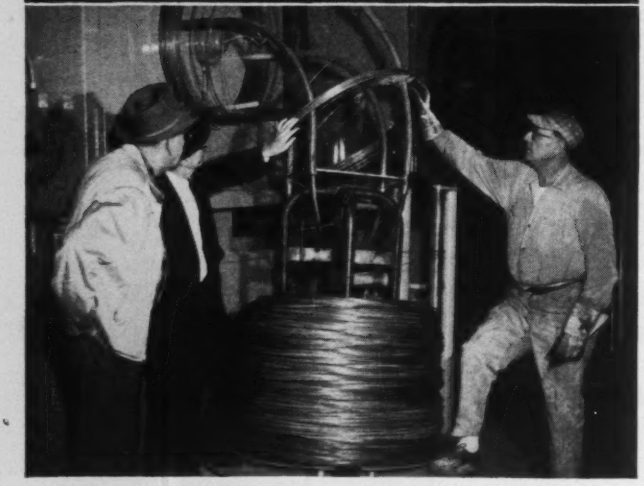
"The base taken for the index is 1957-59, a period including one good year and two poor ones. The average output in this selected base period was 97 million tons, but the output in 1955 was 117 million. Had the three-year period 1955-57 been chosen as a base, the figure would have been 116 million. If the decade 1950-60 had been the base, the average would be 105 million.

Over 100, But—"The index number for 1960 will be 102. But the industry operated at an average of 67 pct of capacity and turned out 99 million tons. This was 16 pct less than in the peak year of 1955.

"With 1961 output estimated at 100 million tons, about two-thirds of capacity, the index will be about 103, but the actual production will be 5 million tons less than in 1951, a decade earlier."

DSC-PORTSMOUTH "LAYER WRAPPED" LPR® COILS GIVE UPHOLSTERY SPRING MAKER OVER 40 MILES OF NON-STOP FABRICATING PER SETUP





LONG PRODUCTION RUN SNAG-PROOF COILS AVERAGE OVER 2200 LBS. .076″ HIGH CARBON WIRE

Improved "Layer Wrapping" Method Steps Up Fabricating Efficiency

DSC-PORTSMOUTH DIVISION, Rod and Wire Department, recently began producing and shipping .076″ Upholstery Spring Wire in Long-Production-Run coils averaging over 2200 pounds in weight and over 40 miles in continuous length. One of these coils is shown in the adjacent photograph.

LONG PRODUCTION RUN COILS are not new. For years we have been regularly producing LPR's weighing up to about 4200 pounds. But it is something like crashing a "New Frontier" to produce spring wire LPR's as light as .076″ in gauge and weighing over a ton — *and packaged in a way that virtually eliminates the chance of snagging or tangling in your pay-off operation.*

THIS CONTRIBUTION to **WIREWORKING EFFICIENCY** is one important result of *"layer wrapping" the strands as the big coils are built up.* This mill operation is shown in the lower photograph.

Would cost-reducing, Long-Production-Run, snag-proof coils fit into your brite wire fabricating picture? *For the complete story on LPR's and "layer wrapping", and answers to your questions regarding application, size-weight ranges and prices, call your DSC Customer "Rep" or write: Detroit Steel Corporation, Box 7508, Detroit 9, Michigan.*

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IN SESSION: Mr. Wright "sits in" on a lecture at GE's Management Research and Development Institute.

AN IRON AGE SPECIAL REPORT TO MANAGEMENT

Line Managers Are the Key Men In Developing New Executives

By **Moorhead Wright**—Manager of Operations, GE Management Research and Development Institute

Managers are not made, they are self-developed. And only line managers can create the environment for effective self-development.

General Electric Corp. management development expert tells how to make the idea work.

▪ No company ever "develops" a manager. A company can only give the opportunity for a man to self-develop. The motivation, the desire, the effort, and the responsibility for development lie within the man himself.

This idea is a prime principle developed in General Electric Corp.'s 10-year continuing research as to what makes good managers.

Another key principle derived from this research is that a man's development is 90 pct the result of his experience in his day-to-day work. Researching this subject, a group of outside analysts talked to 300 GE managers. Over 90 pct of these men said, "I got my greatest development when I was working for so-and-so in such-and-such a place."

Line Manager Key Man—This leads us to a third key principle: The incumbent line manager at all levels is responsible for the development of people who work under his direction.

So we clearly see that the most important factor in a man's development is his working relationship with his immediate manager. And it is the non-delegatable responsibility of the manager to help his people develop.

This may be so, but a number of line managers reading this article may well say, "I never heard of a line manager being fired because he didn't develop people. But I have heard of them getting fired when they didn't get production out the back door, or for drawing up bad specifications or so on." These men feel they have their bucket full running the shop, group or division without worrying about development courses.

Workable Plan—The key, then, is to devise an acceptable, workable plan for line managers to follow in personnel development work.

After many years on both sides of the fence, I am convinced that the fault in manager-man relations lies not with the operating managers, but with us specialists. We have been cooking up procedures which the line managers refuse to follow. They refuse, because they do not agree with the approach and feel uncomfortable when they try to follow it.

Personnel specialists and consultants have their place—at the elbows of line managers. They should never, themselves, directly attempt the manager development. They are counselers and advisers and such cases must work by, for, and through line managers.

Appraisal Breakdown—To begin with, most appraisal forms "mix the drinks." We need to sort out the purposes of appraisals which are: Pay, placement, and development planning. The role of the manager in any one of these three types of appraisals differs greatly from the other two. Let's look at these roles separately.

In appraising a man's work to determine his pay, the role of the manager is that of contracting officer or paymaster. The purpose here is to determine how much the man should be paid for the work he does. The manager is the steward of the owner's money and he has a high obligation to see that the owner gets his money's worth for the salary paid to the individual.

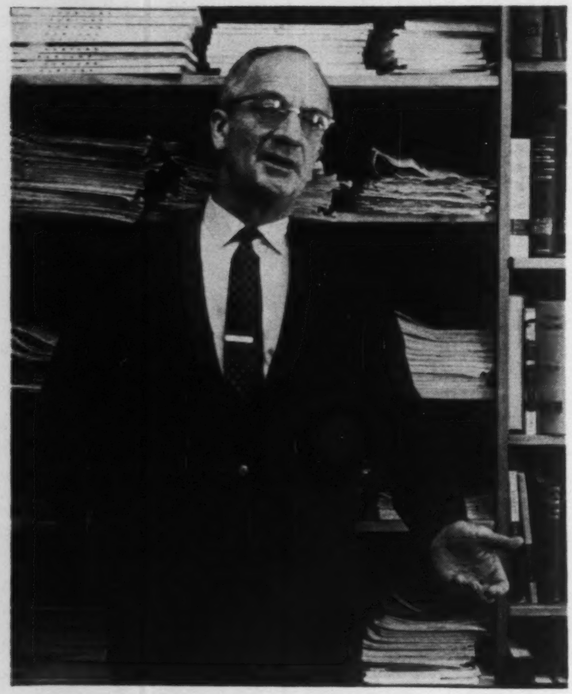
This can be done by having prior agreement between the manager and the man as to his accountability in the position he occupies. Thus, when there is a review for salary purposes, the process is simply to pull out the list of accountability factors in the man's position and to review, as factually as possible, the extent to which the man has met his accountability. Such a review will determine where in the "merit range" the man's salary should fall.

Manager's Decision—In this conference, while the man should be given ample opportunity to state his side of the case, the manager must make the final decision.

Our second reason for appraisal is placement, which includes promotion, lateral moves, and discharges. Here the role of the manager is that of organizer. His task is to establish the work requirements of the job under consideration, and to try to match the capabilities of the individual against these working requirements.

The third reason for making an appraisal of a man is development planning. Here the role of the manager can be that of counselor, challenger and friend. The purpose of the conference is to help the man plan his development activities and

A Manager Can Aid His Men's Self-Development



1. **Recognize the needs of this one individual.** Each man needs a different kind of help. What will help one man will crush another. Therefore one cannot say, "I develop all men by this or that action."
2. **Pour on the work.** Men grow generally through developing "mental muscle," which comes primarily through use of the mind.
3. **Hold high standards.** Refuse to accept sloppy work. Make him "do it over" until the result is as good as he can do.
4. **Set the man tasks that are beyond his experience.** "A mind stretched to receive a new idea never returns to its original shape." A man grows in capability by doing things he has never done before.
5. **Demonstrate your confidence** in the man by giving him riskful decisions to make. Accept the results, good or bad.
6. **What you do with respect to the man** has infinitely more effect than what you say.
7. **Continue education** for any man who wants continuing growth in these times.

to help the manager plan to help in this development.

Positive Purpose—The purpose is not evaluation, rating, performance, review, or pointing out weaknesses. The purpose is a very positive one and one in which managers should find much challenge and personal satisfaction. The unmixing of the purposes and roles and the identification of the development conference as a positive, constructive piece of work will, I believe, do much to encourage managers to hold such conferences.

In fact, this kind of relationship is highly motivating to both parties and more often than not results in much better performance on the job. This fact in itself should be persuasive in getting operating managers to hold such conferences.

Let us then pass over the first two facets of the manager's dealings with the individual (pay and placement) and concentrate on this third activity — development planning.

How can the manager start?

Informal Talk—He can have a conversation with him about it. Not a highly structural and formalized "conference" or "appraisal session" —but a conversation. A two-way conversation about a man's future.

There are three aspects in this approach: Preparation for the conversation, the conversation itself, and aftermath of the conversation.

Both people should prepare. Both should enter the conversation armed with information about the man.

What kind of information? Information about the man's capabilities and drives. Not about his personality traits. But about the things he can do and likes to do. These are the built-in, transportable abilities to do certain kinds of work. Secondly, his incapabilities, the things he does not do so well or like to do, should be considered.

There are three sources of this information: The man's record, the man himself, and observation of the man's work by the manager.

Former Bosses—To get good information from the man's record, the manager needs to go behind the written record of where he has worked. He needs to talk directly with former managers, asking them two questions: What did he do well for you? And, what did he not do well for you?

To get good information from the man himself, he should be required to write and hand to the manager a list of the kinds of work he believes he does well and those he does not think he does well. Added to this should be a statement of the kinds of work he enjoys doing.

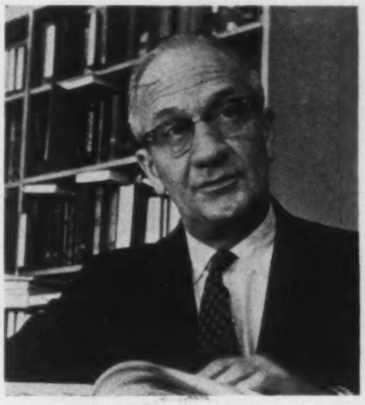
To get good information about the man through the third source, observation, the manager should carry on a careful observation on how the man responds in different situations.

In this aspect, the manager can be creative. He can create real work situations, throw the man into them, and see how he operates. As a simple example, he can appoint the man chairman of the employee picnic committee, and sit back and see how he does the job. Some men will rush in and do all the work themselves. Others will think through the problem, divide the work, appoint people to the jobs, and get the work done in an organized way.

Development Talk—Armed with the best information he can get, the manager is now ready for the development conversation. This is an important transaction as it will have a major effect on the man's self-image and motivation.

Sincerity, attitude, purpose, and relationship are far more important than technique. If the manager enters the session as judge and manipulator, rather than counselor, challenger, and friend, the event will fall short of its potential.

Here are some thoughts or check points which may be useful in holding the development conversation: Remember the purpose of the talk, do more question-asking than talking, be willing to listen, level with the man, talk plain, keep the consideration mainly on present work.



▪ **Moorhead Wright,** starting in 1952, was chairman of a GE study team which made a three-year research into the factors affecting the development of people in a business organization. The findings of this study form the basis of the plan now in use in the company. Mr. Wright has lectured at Harvard and Columbia Universities and the Army War College.

Such a conversation, the principal ingredients of which are concern and sincerity, should establish a new working relationship between the two men. This relationship, based on mutual understanding, can continue as long as the men work together, and may make it unnecessary to hold any more formal conversations along this line.

After the Conference—We are already into the third item on our list: What happens next?

Again, no techniques, no manipulative tricks and no methods that work in every case. But there are a few principles that may help the manager in his difficult task of helping a man who is trying to grow. Scan the list of principles in the box. They are important ones.

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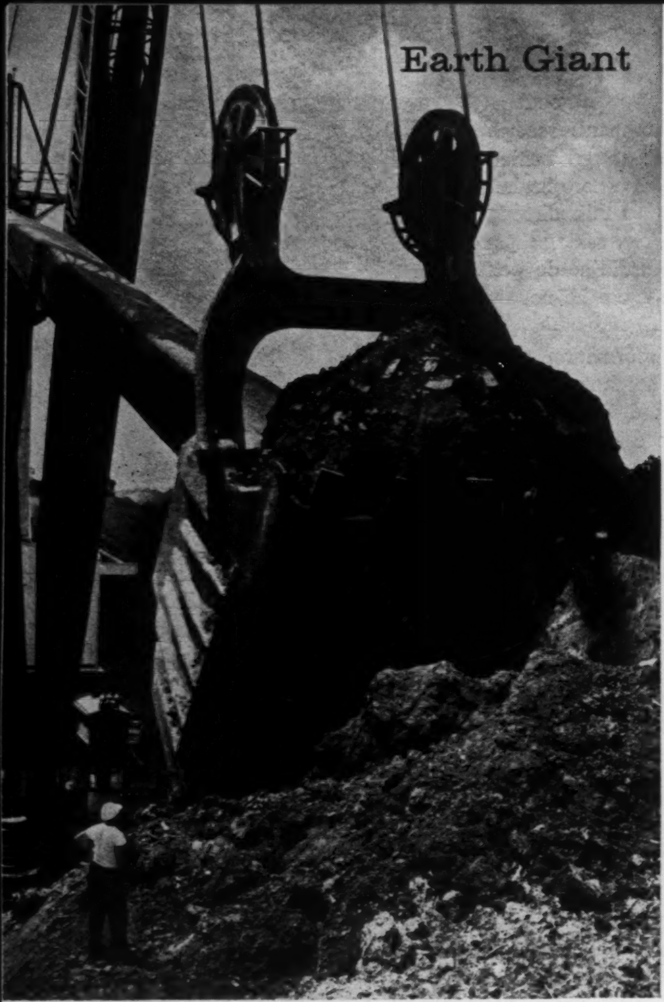

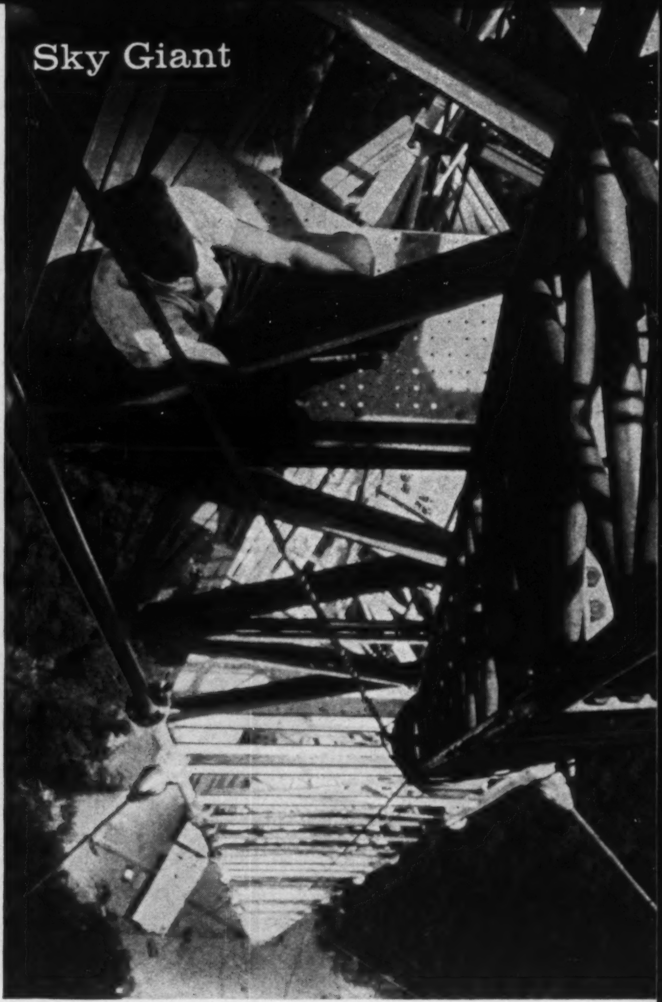

Two more extraordinary welding jobs done with M&T Murex Electrodes

THIS 6,588,000-LB. SHOVEL on the 50-yard line of a football field could dig a 65 cu. yd. dipperfull in one end zone, lift it 140 feet high, swing its 170-ft. boom and pile the 100 ton load atop a 12-story building in the opposite end zone.

THE TALLEST MAN-BUILT STRUCTURE, the new transmission tower for KFVS-TV, Cape Girardeau, Missouri has equally impressive statistics. It stretches 1676 feet skyward. Weighing 1000 tons, it has solid steel legs up to 7½" thick, can withstand over 100-mph winds.

Joint integrity is an absolute requirement for a shovel that chews up huge bites of earth...or a tower built to be buffeted by hurricane-force winds. Isn't it significant that welding on these giant jobs was done with M&T Murex electrodes? The electrode that's good enough to meet these requirements is certainly good enough for everyday jobs too.

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Bright Annealed Demand Rises

More and More Steel Companies Tap Auto Market

Automakers seem to like bright annealed stainless steel. And they'll be buying more this year.

Allegheny Ludlum Steel Corp. has been the big producer of bright annealed. But more competition is expected in the near future.

By A. E. Fleming

COMPLETE SWITCH: Chrysler Corp. is the first auto company to switch entirely to bright annealed for stainless steel trim on its cars.

■ Greater tonnages of bright annealed stainless steel will go to automakers in the coming year.

With few exceptions, Detroit likes the metal very much. It's used for hubcaps, side panel trim, rocker panels, grille and window trim molding and headlamp bezels on 1961 models.

On April 1, Chrysler Corp. will start specifying bright annealed as part of its requirements on all stainless applications. General Motors Corp. reportedly will do the same soon after.

Until now, Allegheny Ludlum Steel Corp., which began big tonnage output of the lustrous steel in late 1960, has had the auto market much to itself. Says an AL production man: "The auto industry is taking every pound of bright annealed steel it can get and wants more." In the past two months, all stainless sent by AL to automakers has been bright annealed.

Big Customers—GM's Ternstedt div. is a big consumer. So are Chrysler's Detroit Eight-Mile Road plant and Ford Motor Co.'s Sandusky, O., hardware and accessories plants.

But AL won't find itself in this enviable position long. Automakers have been told by other steel companies such as Republic Steel Corp. that they'll offer bright annealed soon, some this month. U. S. Steel Corp. will make it available in June.

Improvements — Accompanying the rise in bright annealed capacity in the steel industry are improvements in the metal. Keeping a step ahead of the others, AL last week announced a new alloy, Type 433, containing molybdenum and copper. More corrosion-resistant than Type 430 and priced the same, it will probably replace it among AL's auto customers. Universal Cyclops Steel Corp. also has developed an alloy it intends to market.

The special alloys, producers hope, will help win more customers, especially those who have not been entirely satisfied with Type 430.

Some engineers at Ford have been less than enthusiastic about bright annealed. "It turns bright red if it isn't buffed," complains an engineer. "Sometimes it rusts in assembly plant lots before shipment to dealers." Such gripes are few, however, and may be a cost problem between automaker and parts fabricator.

Cuts Cost—One large auto parts supplier says bright annealing has cut buffing costs substantially. Others estimate various reductions in cost. Although stamping costs are lower, independent fabricators reportedly haven't been passing on the savings to car makers. Auto producers complain that the advantage is all with fabricators right now. Ford has over 50 companies helping supply trim needs.

Still it isn't likely that any automakers would shun bright annealed, since the price is right.

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California Construction Rises

Study Predicts Record Levels This Year

Construction outlays should hit an all-time high of $7 billion in California this year.

The biggest gain will come in private construction. This accounts for two-thirds of the state's projects.

By R. R. Kay

▪ How will California's all-important construction industry do this year?

It should hit $7 billion—an all-time high. That's $309 million or 4.6 pct above last year.

Why is construction so vital to the Farwest's steel industry? Because it shows up 50 pct of the steel used in the region. The $7 billion estimate is for both public and private projects that are pending. It's based on a just-released study made by the California State Chamber of Commerce, Dept. of Economic Development and Research.

The Breakdown—Here's a breakdown of where the money will go: Private building, $4.75 billion; public building, $2.25 billion. Private construction will top the 1960 volume by 4.2 pct. It accounts for two-thirds of all building in California.

The study says private residential starts should hit $2.42 billion this year—four pct higher than in 1960. Non-residential private construction is expected to amount to $1.12 billion or a five pct gain. The big bulk will be in factories, office buildings, stores and banks.

Utilities and Farms—In the estimated $7 billion total, there is also $780 million expected for privately-owned public utilities and $173 million for farm buildings.

Military facilities will account for $208 million; streets and highways, $712 million; flood control and sewerage, $262 million; and public schools, $511 million. About $172 million will go into the construction of publicly-owned utilities.

Auto Market Grows In Los Angeles

Auto population in the Los Angeles area rose to a new high of 3.1 million last year. That topped the New York metropolitan area's 2.3 million cars and Chicago's 2.2 million.

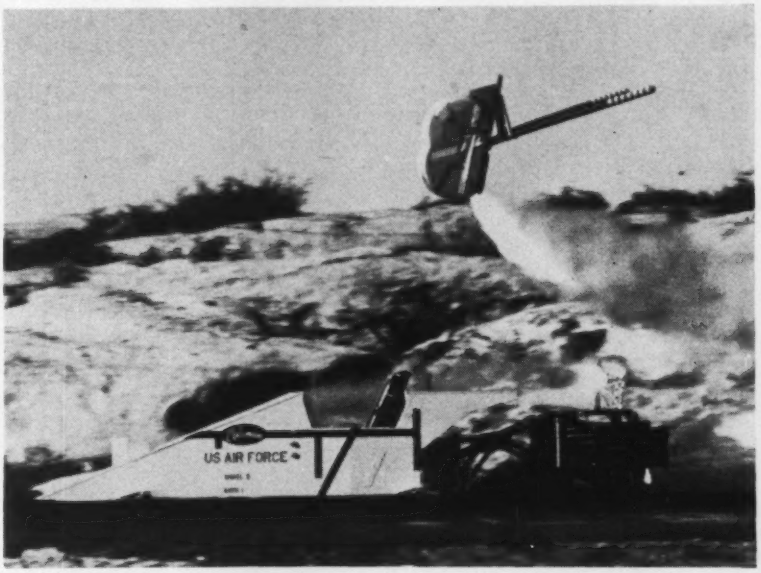
In fact, on a nation-by-nation basis, the Los Angeles area ranks fifth in the world in the number of passenger cars.

Tire Wear—The market for automobiles, equipment and accessories in this area is vast and continually growing. Take a look at the tire market alone:

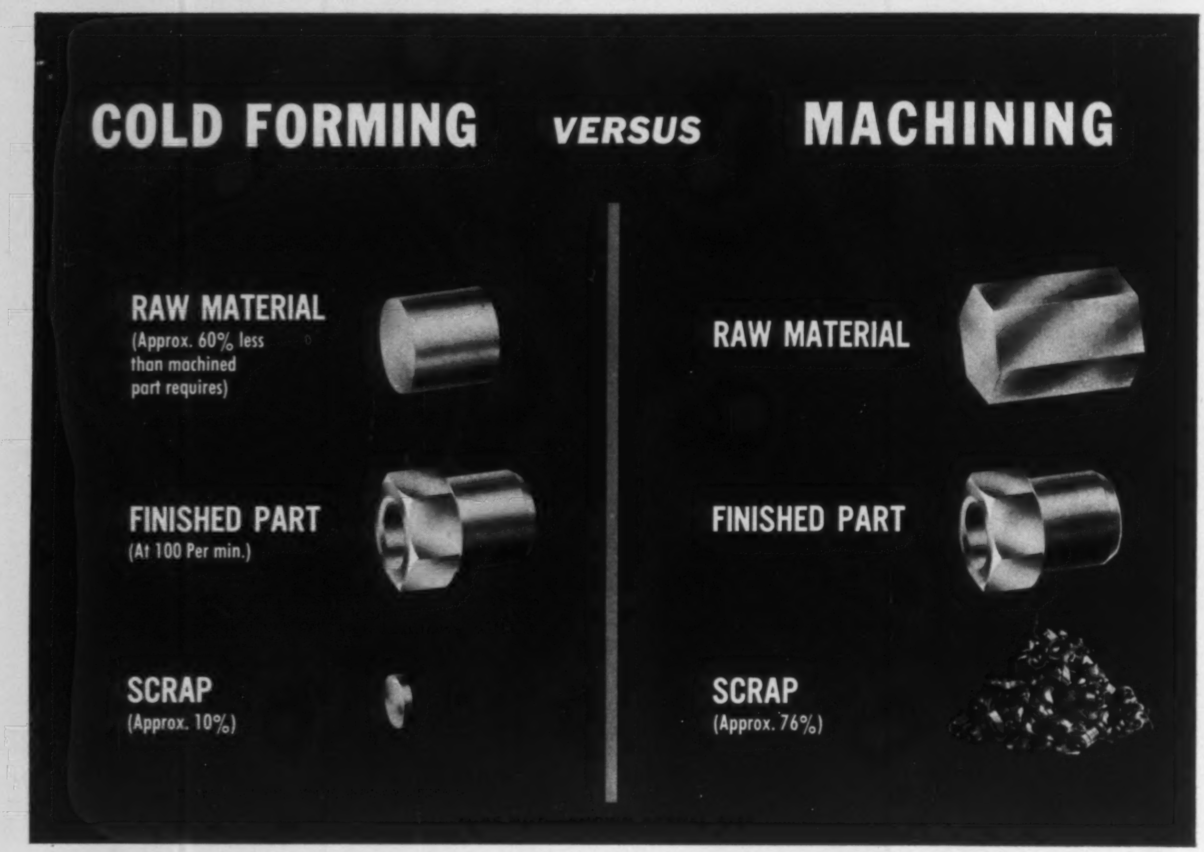
This year, Los Angeles auto owners will spend $110 million for 2.5 million auto tires, the same number of retreads and a quarter million truck tires. It's estimated that the market will grow 27 pct within the next five years.

One major supplier, U. S. Rubber Co., launched a $6 million plant modernization and expansion program recently. The company says it needs these new facilities to keep up with the growing market.

For Quick Departures, Speedy Trips



BLASTING OUT: A B-70 bomber cabin seat, propelled by an ejection rocket, blasts out of a test sled at Hurricane Mesa, Utah. Stabilization booms extend from the rear of the seat. The tests are being conducted by North American Aviation, Inc., builders of the high-speed bomber.


COLD FORMING
VERSUS
MACHINING
RAW MATERIAL
(Approx. 60% less than machined part requires)
FINISHED PART
(At 100 Per min.)
SCRAP
(Approx. 10%)
RAW MATERIAL
FINISHED PART
SCRAP
(Approx. 76%)

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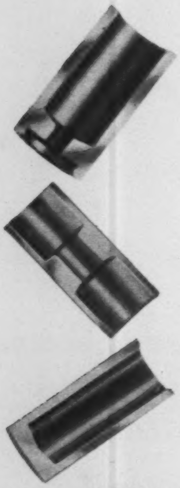

Important economies in the production of a wide variety of parts are resulting from the use of Waterbury Farrel Parts Formers. Advantages include: savings in raw material, higher output and improved physical properties in the finished part.

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WF-74

Automatic Assembly Isn't Dead

And Now May Be the Time to Take Another Look at It

Automatic assembly hasn't lived up to the predictions made for it a few years ago.

But it may be worth your while to reconsider where and how it can be used in metalworking.

By R. H. Eshelman

▪ What ever happened to automatic assembly? When transfer machining lines were sweeping the mass production industries, it was forecast that assembly operations would be next. The trend failed to grow as predicted.

But automatic assembly is far from dead. Instead, it's moving in a new direction: Smaller, more manageable subassemblies.

Exemplifying these developments is a unique rotary machine at Saginaw Steering Gear Div., GM. This unit combines assembly of six pieces in a press and CO_2 welding steps. The part is a ball joint assembly that has grease sealed in. Output is at the fast clip of 300 per hour at 80 pct machine utilization.

Cooperation Counts—Not only has the setup boosted production, it has cut costs, upped the quality and improved the product. Key to this all-around payoff lies in cooperative engineering. Saginaw production engineers suggested changes to the design engineers that allow use of automatic welding. At the same time, they provide the desired sealed-in grease joint.

The old design had been riveted to the frame. Now the ball joint can be installed simply by a self-tapping obtuse thread that locks in place.

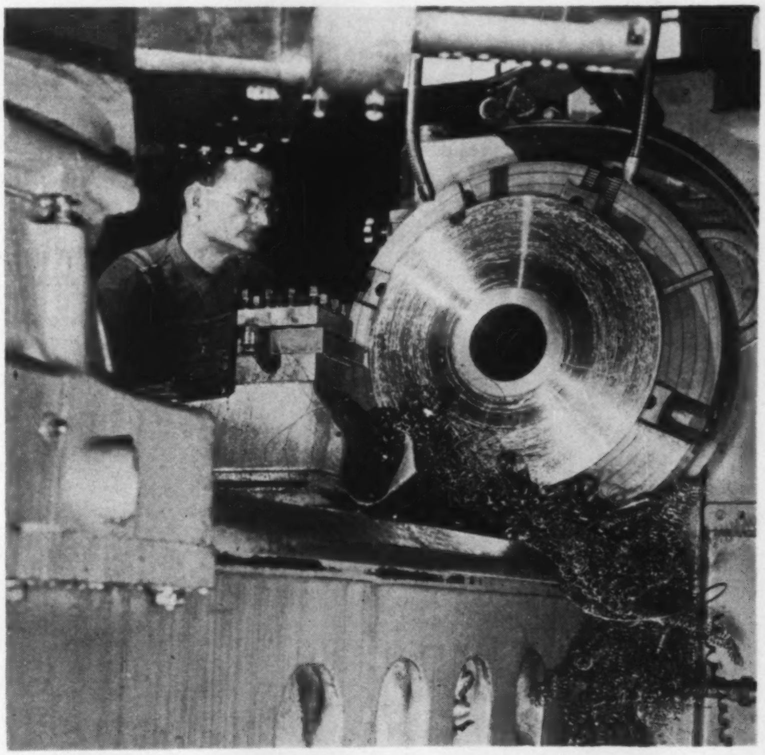
Considerable savings can be attributed to completion of the assembly job in one setup. Machine designers at Expert Welding Co., the builders of the unit, worked out a practical arrangement by close coordination with the producer's methods and process engineers.

Ten Stations—The circular table has ten stations. Vibratory hoppers and track feed automatic loading of the ball joint body; the machine injects lubricant in proper amount in the cup area, then automatically loads a bushing component. The operator, positioned at station four, places stud, spring seat, spring and cap in position.

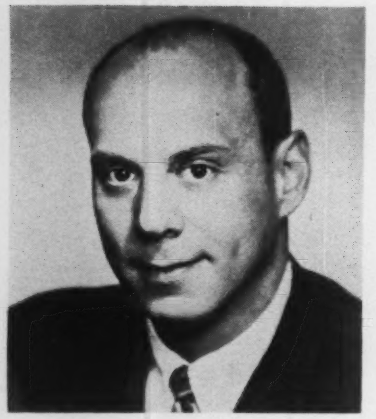
The machine indexes and automatically presses the cap into the body. At a later station it welds the components together to complete the assembly job. Actual weld time is only 3 seconds.

Automatic CO_2 shielded-arc welding is used for the joint, this gives a precise, leak-tight joint. It also utilizes a spinning motion of the parts and the fixture.

Heavy Metal Removal Techniques Pay Off



CUT TO SIZE: As much as 80 lb of metal are rough turned from forgings in just 3 minutes at Cann & Saul Co., Royersford, Pa., on Warner & Swasey turret lathes. Here a gear rim forging is being machined.



R. H. Lewin, elected president, Cerro Sales Corp.

Fastener Div., Spiron, Inc.—**Gordon Moos,** elected vice president.

The Wellman Engineering Co. and McDowell Co., Inc.—**J. J. McGlone,** elected vice president, sales for both companies.

The Matthews Corp.—**R. E. Jones,** promoted to vice president, sales.

Caine Steel Co.—**R. M. McCluer,** named vice president, Eastern Div.; **A. C. Sandell,** named vice president, Southern Div.

Aerojet-General Corp. — **L. W. Mullane,** elected vice president, Downey Plant.

Centrifugal Casting Div., Shenango Furnace Co.—**W. H. Johnson,** named technical director, Dover, O.

The Beryllium Corp.—**D. W. Perkins,** appointed engineering director.

The Sheffield Corp.—**J. S. Gorrell,** named treasurer.

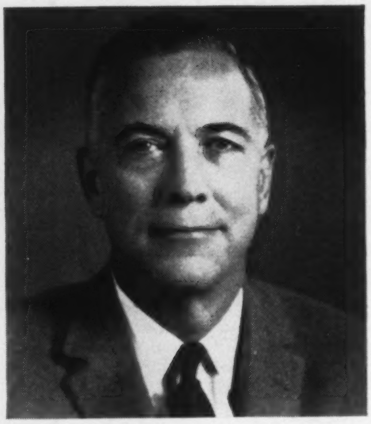
Armco Steel Corp., Armco Div. —**R. G. Sloan, Jr.,** appointed manager, magnetic steel products.

Pesco Products Div., Borg-Warner Corp. — **R. C. Brewer,** named sales manager, commercial products, Sales Dept.; **D. C. Tabb,** named manager, planning and sales administration.

The Youngstown Sheet & Tube Co.—**K. R. Walker,** named market analyst, Commercial Research Dept.

Colorado Fuel & Iron Corp.—**K. L. Welling,** appointed district sales manager, Spokane district.

The Sharon Steel Corp.—**F. K. Webb,** appointed works manager, Fairmont Coke Works, Fairmont, W. Va.



A. B. Wilson, elected president, Harbison-Walker Refractories Co.

Enamelstrip Corp.—**G. H. Fitch,** appointed general manager.

Pennsalt Chemicals Corp. — **E. M. Ott,** appointed manager, market planning.

International Business Machines Corp.—**L. L. Horn,** appointed director, manufacturing services.

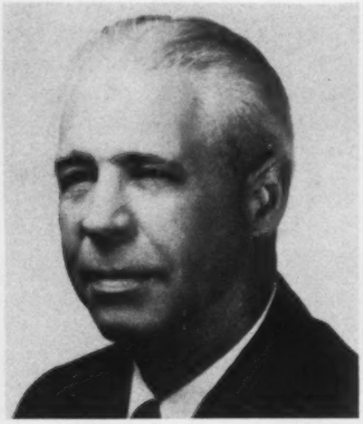
Minneapolis-Honeywell Regulator Co., Electronic Data Processing Div.—**J. M. Sterling,** appointed factory manager.

Engine-Material Handling Div., Allis-Chalmers Mfg. Co.—**R. M. Scott, Jr.,** appointed Philadelphia branch manager.

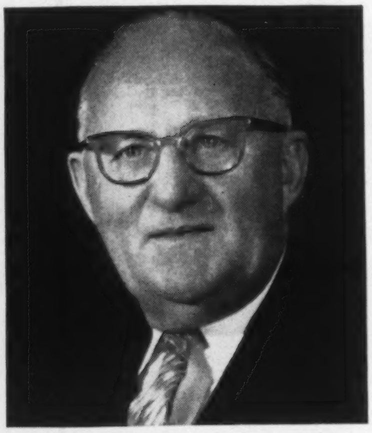
The A. O. Smith Corp., Welding Products Div.—**A. R. Schneller,**

(Continued on P. 82)

C. W. Schuck, elected executive vice president, Braeburn Alloy Steel Corp.



D. L. Robertson, named executive vice president, Apex Steel Corp., Ltd.



E. A. Garber, elected chairman of the board, Harbison-Walker Refractories Co.

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New B&D Heavy-Duty Industrial Vacuum Cleaner Line is longer, offers more power for all-purpose pick-up!

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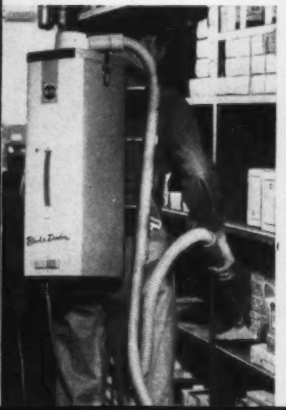

Scoop up metal chips, clean up wet, slippery floors with B&D's new stainless No. 65. Low tank outlet for easy wet-disposal.

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(Continued from P. 80)

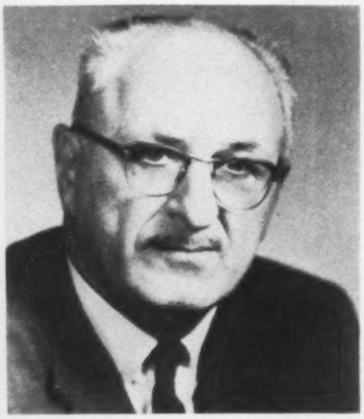
named manager, new welding region. He is responsible for sales out of the Division's western offices, Newark, Calif.

Huck Manufacturing Co.—**C. F. Marschner,** appointed manager, fastener development.

C. H. Kuenzi, appointed vice president and general manager, Fischer & Associates, Inc.

Vickers Inc., Div. of Sperry Rand Corp.—**W. H. Freitag,** promoted to district sales manager, Portland, Oregon area, for mobile hydraulic equipment sales; **R. W. Davis, Jr.,** named application engineer, same office.

The Electric Storage Battery Co., Exide Industrial Marketing Div.—**J. A. Mustard, Jr.,** promoted to asst. to the vice president, marketing.



H. W. Baque, named vice president and asst. to the president, Corhart Refractories Co., Louisville, Ky.

J. K. Meyer, appointed vice president and general manager, Corhart Refractories Co., Louisville, Ky.

The Bendix Corp.—**R. R. Winn,** named Great Lakes regional manager, Bendix Industrial Controls Section.

Contract Manufacturing Div., Cutler Metal Products Co.—**E. F. Olson,** appointed sales manager.

E. J. Lavino & Co., Refractories Div.—**Harbour Mitchell, Jr.,** appointed manager, engineering services.

Lenvik Ylvisaker, elected vice president, research and engineering, Continental Can Co.

Quaker State Metals Co., Div. of Howe Sound Co.—**E. W. Guion,** appointed asst. manager, fabricated products.

Daystrom, Inc., Weston Instruments Div. — **E. M. Duda,** appointed district manager, Cleveland office; **J. L. Cattanach,** appointed manager, Boston district office.

W. T. Haddon, appointed general manager, steel sales, Alan Wood Steel Co.

G. G. Karian, appointed general manager, Iron Powder Div., Alan Wood Steel Co.

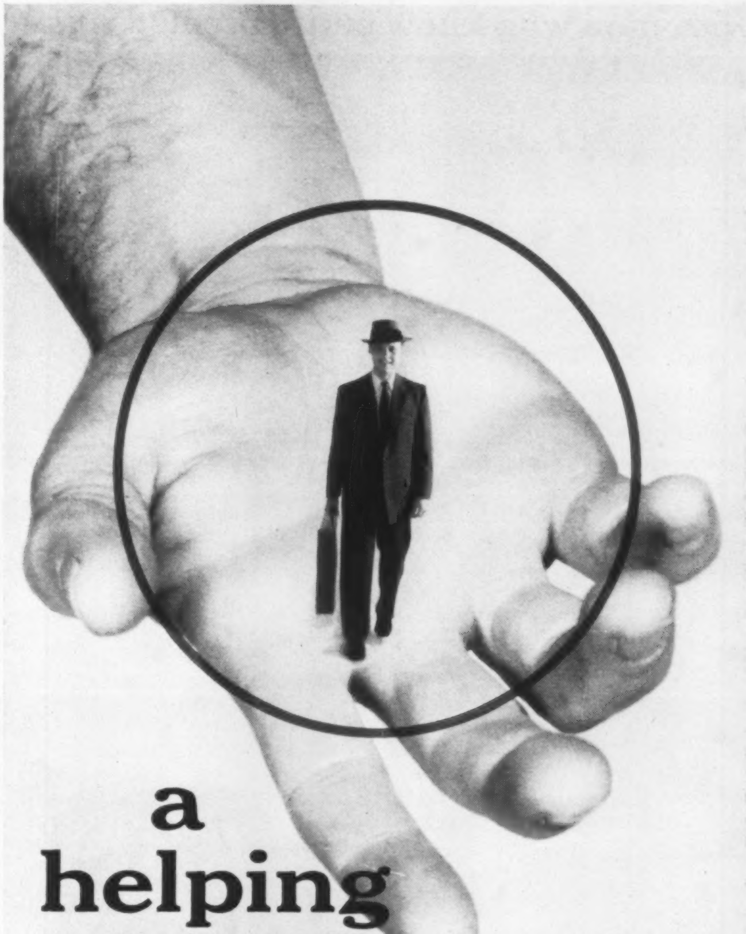
Great Lakes Steel Corp., Div. of National Steel Corp.—**R. W. Garrard,** appointed district sales manager, Detroit office; **J. E. Bartholomew,** named district sales manager, Lansing office.

Ford Motor Co., Automotive Assembly Div.—**W. J. King,** appointed industrial relations manager.

The Foxboro Co.—**W. E. Vannah,** appointed an associate for advanced engineering.

OBITUARY

Paul Wooton, Washington, D. C., representative, Chilton Co., Philadelphia.



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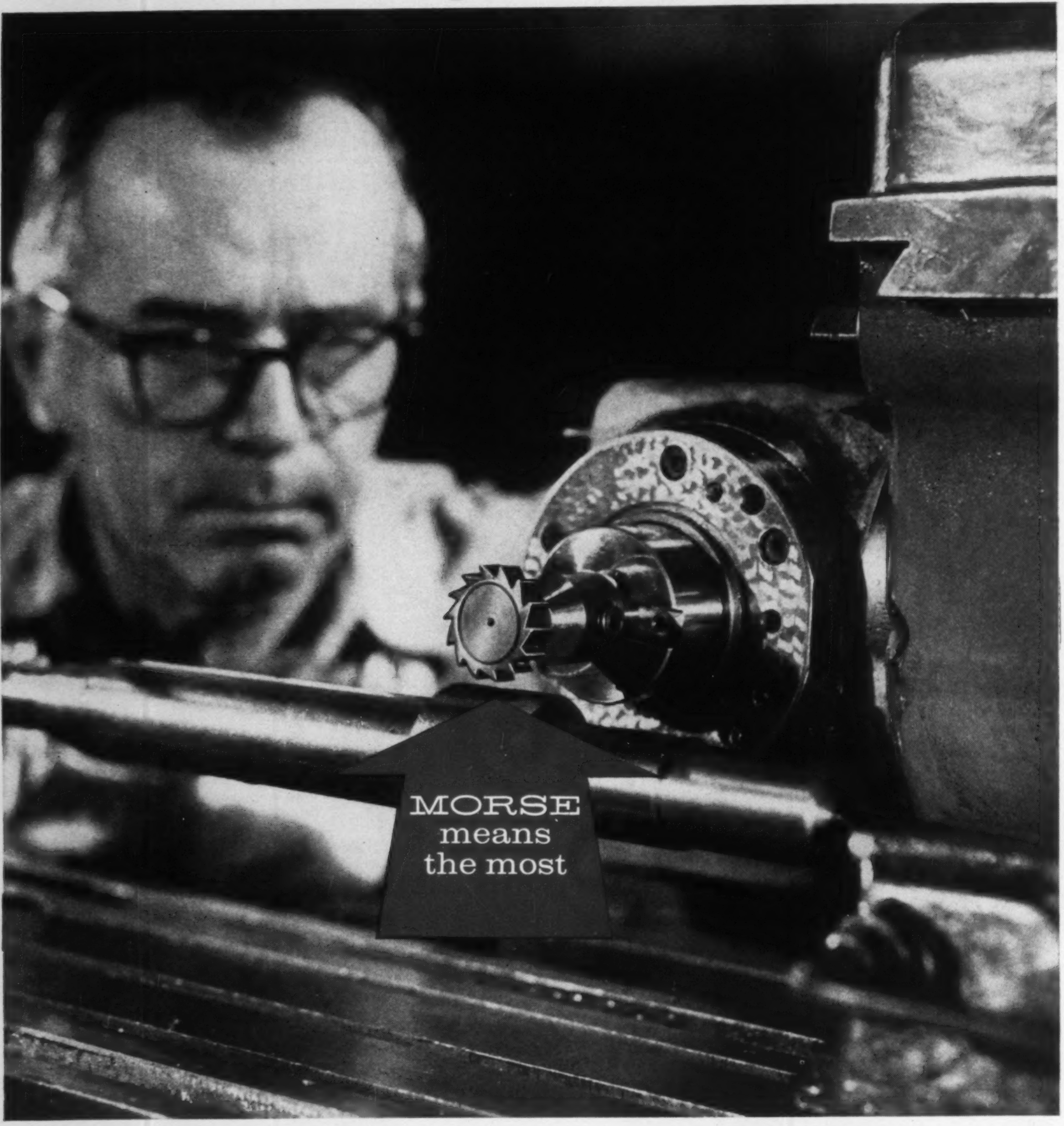

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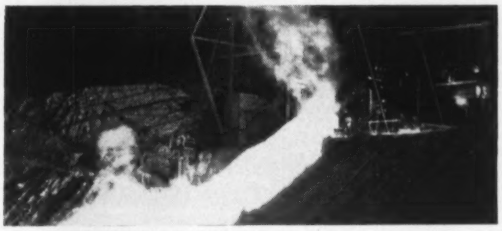
Another Use for Polaris

The use of a rocket like the Navy's Polaris missile as a satellite launcher may not be too far in the future. J. H. Wakelin, the Navy's Asst. Secretary for R. and D. says the Defense Department has approved plans to start development of such a satellite-launching rocket based on the Polaris. The project will be a joint effort of the Navy and NASA.

Boosts Casting's Strength

Steel castings can now be strengthened by press forging. A 400-600 pct increase in yield strength and 200-250 pct increase in ultimate tensile strength with 18-8 stainless steel have been obtained. Success of the project will permit the use of forged castings in aircraft and missiles in place of certain straight forgings. Results: Lower costs in material, tooling, production.

Million-Lb Thrust



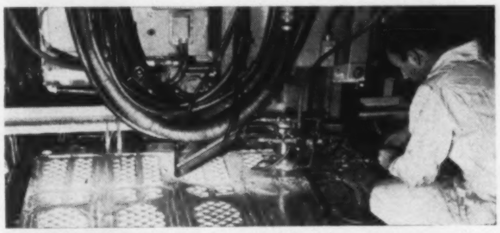
SPEWING FLAME is F-1 rocket engine

In tests leading up to firing of complete engine later this year, the prototype thrust chamber for the F-1 engine has developed thrusts of more than 1,000,000 lb. Using high-energy liquid hydrogen-liquid-oxygen propellant, the F-1 may be used in a cluster of four to six units as first stage for the Nova launch vehicle.

Satellites for Defense?

Air Force researchers are studying the use of satellites as a defense against intercontinental ballistic missile attack. Lt. Gen. B. A. Schriever, chief of Air Force research, says an anti-missile missile to be fired from an orbiting satellite is now under study. He says the Air Force is enthusiastic about the possibilities of "an unmanned satellite with an automatic-detection system and an automatic weapon" to destroy enemy missiles just after launching.

Mill Carves Waffle Design



AUTOMATIC MILL cuts 16 skins at one setting.

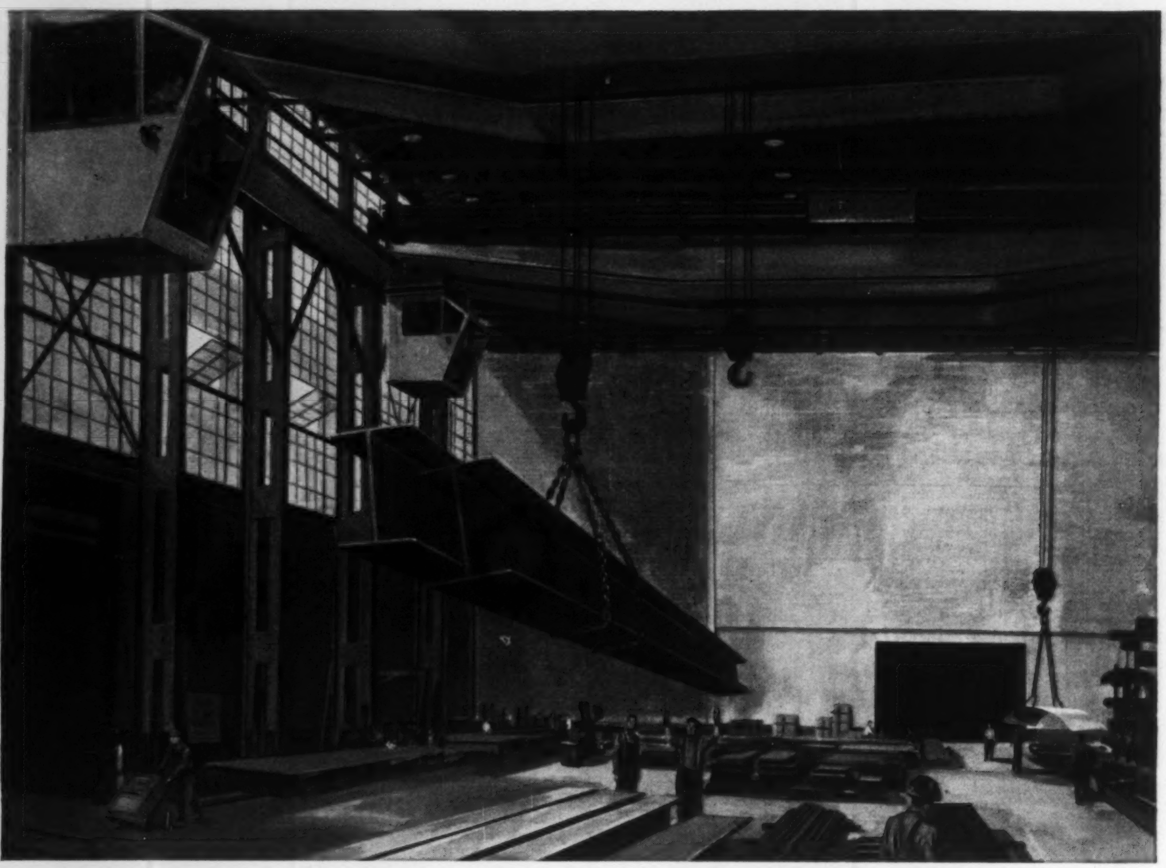
Skin mills are now being adapted for cutting small, intricate patterns in sheet magnesium. Skins for the Bomarc ramjet-engine struts are carved in a waffle pattern on the underside to decrease weight of the part. In earlier test models, the strut-skin pattern was etched. Boeing Airplane Co. figures savings of $283 a missile.

Beryllium Gains Favor

Look for beryllium to find its way into more aerospace applications. Answers are being found for the cost and fabrication problems. As material uses grow, price is expected to drop to near $50 per lb. Some new applications are in missile and rocket inertial-guidance systems, and brake drums on the B-70 bomber. More will follow as Air Force fabrication studies go on.

Extrudes Titanium Nuts

Low-cost manufacture of titanium fittings is now possible by precision cold-extrusion techniques. A hexagonal nut for aircraft-quality tube fittings, for example, is normally made of steel or aluminum on automatic screw machines; machining of titanium is too costly. The new process halves this cost. Other advantages: Strengthening by work hardening; excellent surface finishes.



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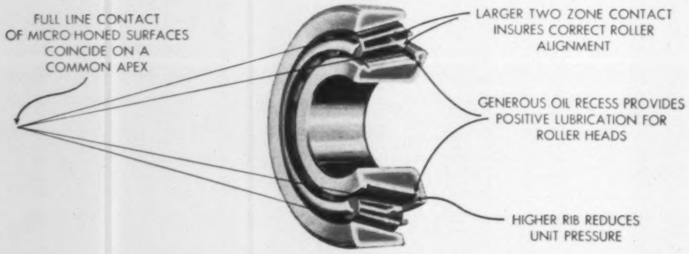
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LARGER TWO ZONE CONTACT INSURES CORRECT ROLLER ALIGNMENT
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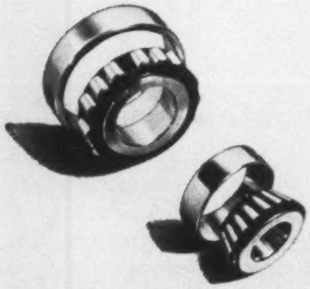
HIGHER RIB REDUCES UNIT PRESSURE



How Space-Age Energy Sources Spark Rise of New Materials

By **R. M. Treco**—Senior Research Associate, Olin Mathieson Chemical Corp., New Haven

Whether it's a nuclear-power plant, chemical fuel or direct-energy device, each faces the materials barrier.

Problems of temperature extremes, irradiation, corrosion, and weight must be tamed.

▪ Materials needs for the '60s will be greatly influenced by the growing demand for energy of all types.

For our accelerating space programs, for instance, there are several unconventional types of energy being developed—for propulsion or for the smaller auxiliary power units.

But, whether it's a chemical fuel, a direct-energy conversion device or nuclear fission that provides the energy, each faces a materials barrier. What will it be made of? In what material will it be contained?

Long Way To Go—The use of nuclear power to propel space vehicles is still in its infancy. Rockets, missiles and satellites all suffer from the same problem—weight. The need for radiation shielding for both personnel and equipment complicates the problem.

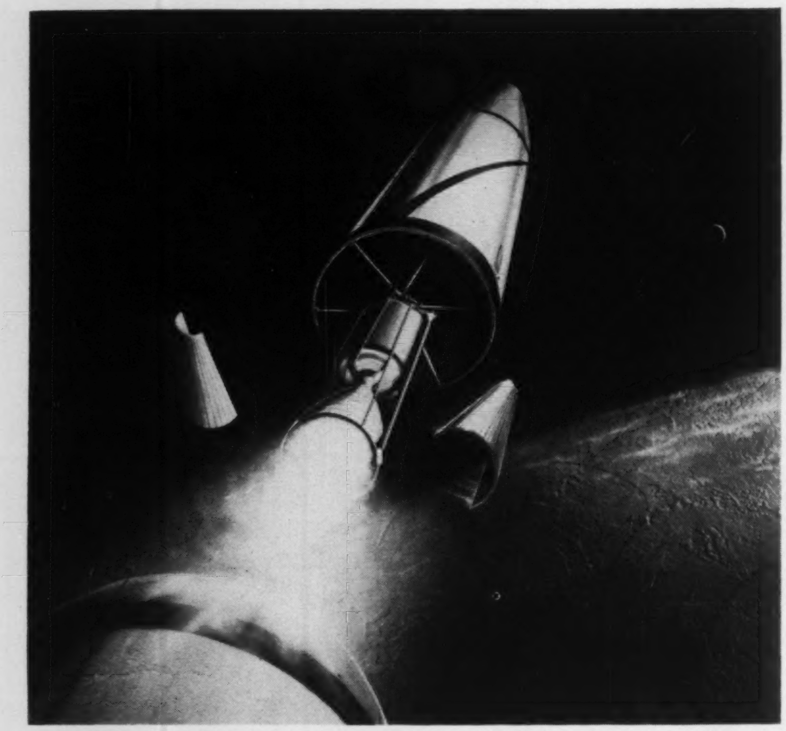
Power plants for these space vehicles can get prohibitively heavy. That's why nuclear energy appears to be the answer when power levels higher than 100 kw for 10-100 hours are needed.

Space travel has its own problems. One of these is the thermal barrier. Rockets and missiles, due to their high speeds, meet temperatures up to 15,000°F when they re-enter the earth's atmosphere.

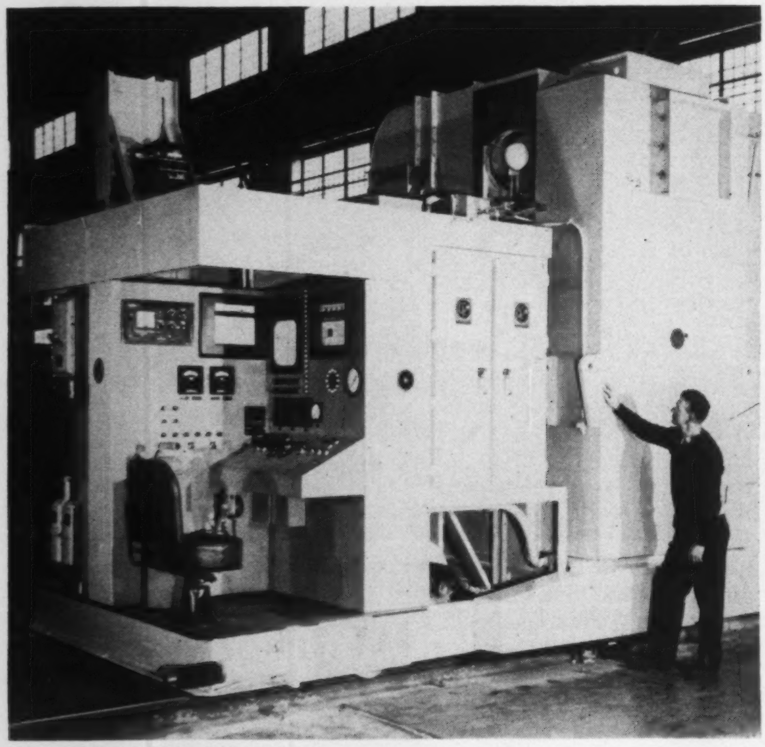
HEATER-FREEZER: Thermoelectric devices have great potential for space vehicles. But, first, the materials barrier must be hurdled.

There are no materials to directly withstand these high temperatures without melting after a certain length of time. To keep missiles from disintegrating, it's necessary either to conduct the heat away or to lower the effective temperature of the nose-cone material.

Cools Nose Cone—Three cooling methods are under study. The transpiration process uses an auxil-



WHAT'S IT MADE OF?: Hardware for nuclear space engine such as this KIWI design must withstand irradiation and high temperatures.



CHARGES ATOMIC FUELS: Loading atomic fuels and removing radioactive wastes in nuclear reactor calls for special fuel handling vehicle. Shielding it requires special metal closures, seals and valves.

iary fluid which is forced through the pores in the material. Evaporation of the fluid absorbs heat and cools the nose cone.

Another method is the heat sink. It uses a material which soaks up heat faster than it melts. Copper is a good example. However, this process cannot continue indefinitely; some other cooling process must be used also.

The present trend favors ablation. This is the gradual layer-by-layer burning or erosion of certain materials such as plastics.

The plastic nose cone has been very successful in the Jupiter missile. In general, ablation cones are lighter and more efficient than other devices. They're also easier to fabricate; and material cost is low.

Withstands Erosion — There are other critical areas in rockets and missiles. Tail nozzles have to withstand high temperatures and eroding gases. One material used for these nozzles is a special type of silicon carbide. It resists corrosion and abrasion up to 4000°F. Yet, it has high thermal conductivity and good thermal-shock traits.

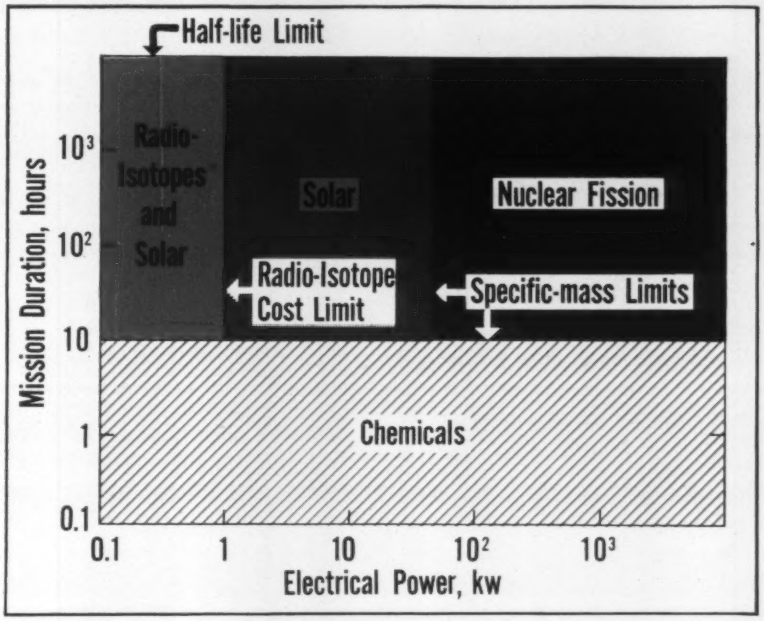
Rocket casings must combine structural rigidity and minimum weight. Consider the Atlas missile, for instance. At the moment of firing the missile casing must hold together 130 tons of dead weight. The casing material is a Type 301 stainless steel less than 0.040-in. thick.

Other rocket casings have been made of high-strength steels able to withstand stresses as high as 240,000 psi. These steels are usually vacuum melted. The excellent surface finishes obtainable are important for preventing fatigue failures.

Nonferrous alloys are also being developed for high-temperature use. Examples include the new magnesium alloys which contain rare earths and zirconium. In addition to light weight, magnesium alloys have excellent vibration damping and heat absorption traits.

Heat Is Problem—What materials will be used for nuclear-power stations? Again, consideration must be given to the problems of radia-

Which Energy Source Will Do?



TAKE A CHOICE: Each unconventional energy source has its own particular advantage. Chemicals, for example, have high power but limited life.

tion and high temperatures. The temperature problem is particularly acute.

To prevent damage to the fuel, a cooling medium extracts large quantities of heat. Heat then transfers through one or more cycles to an electric turbogenerator to obtain useful power.

Various cooling media are used. The most common is water. Often, liquid metals, such as sodium or bismuth alloys, are used. However, some planning must be given to the chances for erosion and corrosion of the fuel and cladding system by these liquid metals.

Alters Properties—Irradiation often produces great changes in the properties of reactor materials. For example, pressure vessels made of carbon steel may show a marked increase in strength and a large decrease in ductility.

These changes in mechanical properties make the present boiler codes inapplicable for irradiated metals. Result: maximum factors of safety — with their consequent higher cost—must be used.

For lightweight auxiliary power supplies, direct-energy conversion appears to be the most promising approach. Devices of this type convert heat or chemical energy directly into electricity without intermediate coolants or generators. The best known are solar cells, thermoelectric devices, thermionic - emission devices, and chemical fuel cells.

The direct conversion of heat to electricity by the thermoelectric effect has received widespread attention. One well-known form of this device is the common thermocouple used to measure furnace temperatures.

What's the Voltage? — Materials for thermoelements or semiconductor elements must be chosen on the basis of the maximum voltage developed by heating to temperatures as high as 1100°-1200°F.

They must also have low electrical and low thermal conductivity. Lead telluride and lead selenide are examples. Unfortunately, most of the materials with good electrical properties are difficult to fabricate; they are apt to be brittle and difficult to bond to conductors. As a result, most semiconductors are made by growing single crystals or hot pressing powder mixtures.

Efficiencies of energy conversion as high as 10 pct can be obtained with these devices. It's anticipated that power supplies for space applications can be as light as 5 lb per kw—and with good mechanical and thermal stability.

Like a Radio Tube — Another method for direct conversion is the thermionic source. It operates somewhat like a radio tube. The flow of electrons occurs between cathode and anode because the cathode surface is an electron-emitting material, such as tungsten. For some applications, carbides of nickel, thorium, zirconium or uranium may be used.

If the cathode is heated by nuclear fission, a substantial electric current may flow. And injecting some cesium into the tube increases this flow.

These innovations present materials problems because of the high temperatures and the corrosive nature of the cesium gas. Other materials problems occur in structural-connecting parts due to thermal expansion. Still, the thermionic diode is considered to be very promising in respect to space applications because of its potentially light weight of 1 lb per kw.

Need Parallel Progress—In general, it appears that the problems of energy conversion, nuclear power generation and space flight all entail certain common material elements. And no one of these fields can progress without some comparable development in the others.

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Shrink Fittings Speed Assembly Of Diecast Rotors on Shafts

An automated shrink-fitting and post-heating machine simplifies rotor production.

Bent shafts and undesirable eddy currents have been reduced to a negligible factor.

▪ A major electrical-appliance maker has stepped up production rates while boosting the quality of diecast rotors. These rotors serve in small induction motors.

Installation of a new post-heating unit made by the Selas Corp. of America, Dresher, Pa., eliminates the need for force fits. As a result, the number of rejects due to bent shafts is now almost nil.

Each rotor consists of a stack of stamped-steel laminations. Diecast aluminum conductor bars pass through holes in the laminated plates. Shorting bars are fixed on each end of the stack.

Completes Circuit—To make each rotor, assembled cores of magnetic-steel laminations are clamped in a die. Then molten aluminum, flowing under high pressure, fills the conductor-bar slots. This forms the motors' retaining-end rings and fan vanes.

The solidified aluminum binds the assembly together. It also completes the electrical circuits.

Diecast rotors offer a dual bonus over rotors which are wound with copper wire. They cost a lot less. And, it takes less time to diecast than to wind a rotor.

HEAT AND SERVE: One man inserts rotor assemblies in fixtures on the post-heating machine. After the heating cycle is completed, a second operator positions the hot assemblies over shafts on a fixture table.

Stray Filaments—But with diecast rotors, everything isn't a bed of roses. During the diecast operation, small aluminum filaments are forced into tiny crevices between the tightly-held steel plates.

During punching, burrs form on the plate surfaces. When the thin plates are stacked together, these burrs create the crevices. No matter how much pressure is applied to the stack, the crevices can't be pressed out.

Electrical-conductor paths, formed by the stray filaments in the crevices, cause eddy currents in the laminations. This reduces motor efficiency.

Resists Eddy Currents—The resistance of the rotor laminations to these stray currents is increased by heating each rotor assembly, in an oxidizing atmosphere, to a temperature somewhat below the diecast metal's melting point.

This heat treatment is commonly known as "post heating" after diecasting. It reduces eddy currents. This, in turn, boosts motor efficiency.

All post-heating work takes place in an automated machine, made by Selas. This rotary post-heating machine occupies only 49 sq ft of floor space. It has two heating zones of about equal peripheral length.

Burners in the outer wall of the machine fire toward the center. The first zone heats the rotors from room temperature to 950°F. The second, or soaking zone, maintains the temperature for a short time.

No Blisters—Close heat control is a must. Even a small overshoot could blister the aluminum. The result would be inferior-quality rotors.

The cycle used to achieve correct heating of various rotor sizes has been pinpointed by trial-and-error tests. It's regulated by heat-chamber settings and conveyor speeds.

Normal practice, when there's little variation in rotor size, is to run the conveyor at a constant speed. The heat-index setting is altered to suit changes in rotor size.

Built into the machine, however, are provisions for changing the conveyor's speeds. This makes it easy to process a wide range of rotor sizes.

Rotates in Furnace—Each workpiece rotates on a spindle-like fixture as it travels through the heating zones. Rotation insures uniform heating over the rotor's entire periphery. No rotation is applied during the time the spindle fixtures travel through the load-unload area.

Controlled combustion of natural-gas fuel and air heats each rotor in about 3½ minutes. A Selas combustion controller takes 1050 Btu of natural gas from the plant's low-pressure line. It draws air from the room. Then it mixes the two in a preset ratio and compresses the mixture for delivery to the burners.

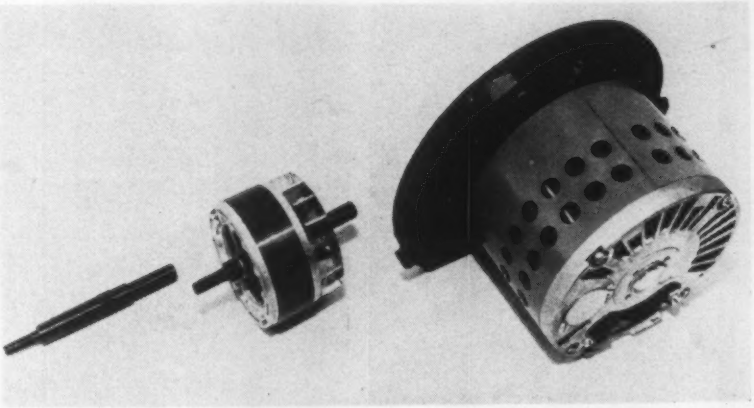
The air-gas mixture ignites against the cup-shaped refractory surface of each burner. This beams radiant heat, with a high thermal gradient, directly on the workpieces.

Combustion is completed within each refractory cup. Thus, the flames don't impinge on the rotors.

Sounds Warning—Two temperature-control instruments regulate the fuel input through valves on each of two fuel-gas air-mixture supply lines. A third instrument, set a few degrees above the control temperature, acts as a safety device on the fuel line.

If the heat gets too high, the safety opens a circuit to de-energize a holding solenoid. This solenoid, in a normally-closed fuel-shutoff valve, sets off a warning horn.

Along with post-heating work, the machine serves another purpose. It provides heat to shrink fit the rotors on their shafts.



THREE STAGES: Diecast rotor fits over machined shaft. Rotor-and-shaft assembly serves in induction motor (right) for washing machine.

CENTRAL CONTROL: Operator selects desired temperatures for both heating zones at a control panel. Warning horn is located on panel top.

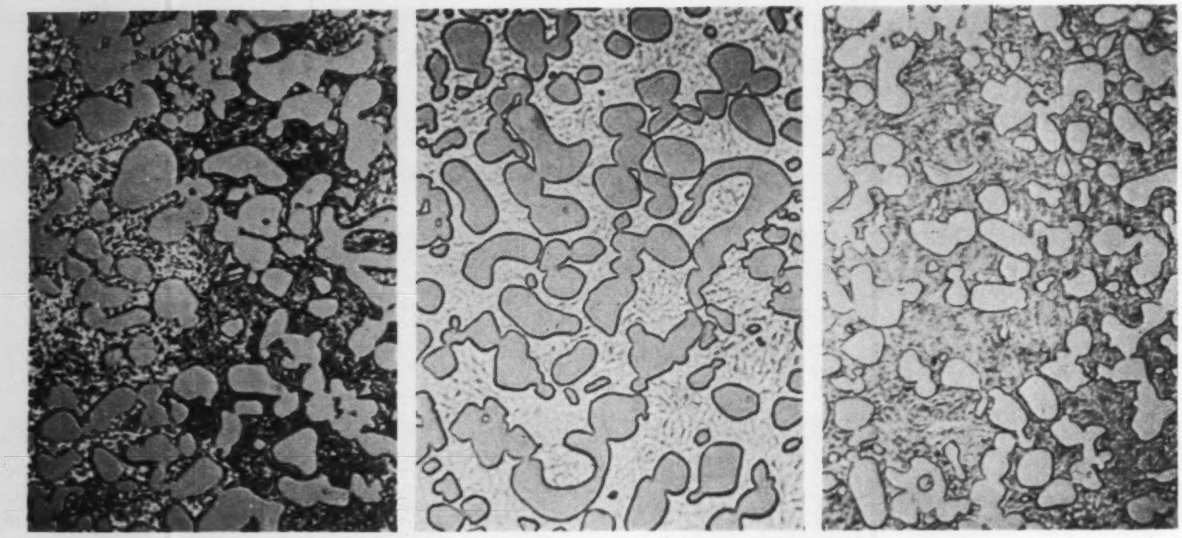
Previously, shaft-and-rotor mounting was done at room temperatures. Two men did this work. One man drilled a hole in each rotor and hammered the shafts in place. A second man operated a hydraulic press. He pressed the shafts firmly onto the rotors. Bent shafts were a common problem.

Double Duty—The new machine requires only one operator. However, if a high output is desired, two workers can service the same machine.

One man loads the rotors in the work-holding fixtures. Another man unloads the hot rotors as they emerge from the heating chambers. He places these hot rotors on the shafts.

Locating fixtures hold the shafts upright. After letting the assembled rotors cool for a few seconds, the operator lifts each assembly onto an overhead conveyor. The conveyor transports all parts to a water-immersion quench.

Now, let's check out a one-man operation. The operator loads every second spindle of the machine. He sets up the rotor shafts on a fixture table. Then he inserts the hot rotors over the shafts and places the assemblies on the conveyor.



MATRIX IS CLUE: Microstructure varies with austenitizing temperature. Quenching from 1400°F (left) incompletely transforms steel matrix. Quenching from 1750°F (center) or 2350°F (right) gives martensitic.

New Heat-Treatable Carbides Offer Job Versatility

By **J. L. Ellis**—Vice-President, Chromalloy Corp., West Nyack, N. Y.

Key to the performance of this new material is its unique teaming of properties.

It has a steel's heat treating and forming traits, and the wear resistance of a carbide.

▪ One of the most unique materials to be developed in recent years for the tooling and machinery industries is a new type of cemented carbide. It combines the ease of fabrication of a tool steel with the long-wearing properties of a carbide.

The new material consists of 45 pct titanium carbide by volume bonded with a chromium-molybdenum alloy steel. It's a powder metallurgy product made by liquid-phase sintering in vacuum.

In the annealed state the new steel-bonded carbide, called Ferro-Tic "C," is readily machinable. Moreover, oil hardening from 1750°F transforms it into a material with very high wear resistance.

Set High Goals—Ease of machinability was one of the key properties sought when developing this material.

Machining tests were carried out on different compositions. When the hardness of these annealed composite materials reached Rc 55, it was found that simple turning no longer formed metal chips of the usual type; instead, it produced dust. Thus, Rc 55 was taken as the upper level of machinability.

Moreover, the more difficult fabricating operations could not be performed on material of this hardness. Thus, it was decided to derive a composition which had a hardness of about Rc 40 in the annealed state.

At this hardness level there's little difficulty in doing conventional machining. This material, in fact, machines more readily than a standard steel of equal hardness. And in the annealed state it machines in much the same way as annealed high-carbon, high-chromium steel.

Try Turning, Too—A series of turning tests was also carried out. The purpose: to obtain data on the selection of cutting tool materials, tool geometry, speeds and feeds.

A bar of annealed steel-bonded carbide, about 1 in. diam and 7 in. long, was turned with a single-point cutting tool. A 0.062 in. depth of cut was used; all turning was without coolant. Relief angles, side rake and cutting-edge angle were 5°; nose radius was 1/32 in.

What were the findings? A general purpose C-2 grade of tungsten carbide is best suited for roughing and general machining. Speeds should be held to about 20 fpm. Longer tool life is obtained when reducing the feed to about 0.009 in. per revolution. For quick stock removal, a feed of 0.020 in. per revolution is satisfactory.

An M-1 type of high-speed cutting tool can be also used to advantage. This is when cutting speeds are reduced to about 15 fpm and feeds to about 0.009 in per revolution.

How About Hardenability?—The photograph shows a longitudinal section through the center of a 7-in. long cone, 2 in. diam at the broad end and ⅝ in. diam at the narrow end.

The cone was oil quenched from 1750°F and then sliced longitudinally. The photograph shows the positions where hardness readings were taken. None of the values was below 70 Rc. This depth of hardening is more than adequate for most tooling applications.

How to Heat Treat?—Conditions for heat treating steel-bonded carbides were difficult to predict from a simple study of the chemistry.

To determine proper hardening cycles, specimens were oil quenched from a series of temperatures.

Quenching from 1400°F incompletely transforms the steel binder. Quenching from 1750°F and 2350°F results in martensitic matrices. Normal steels are usually austenitized slightly above the upper transformation temperature to keep grain growth down.

Affords Wide Range—In steel-bonded carbides the titanium carbide phase restricts grain growth. A fairly large range of austenitizing temperatures can be used.

Check Physicals

Nominal Composition, pct

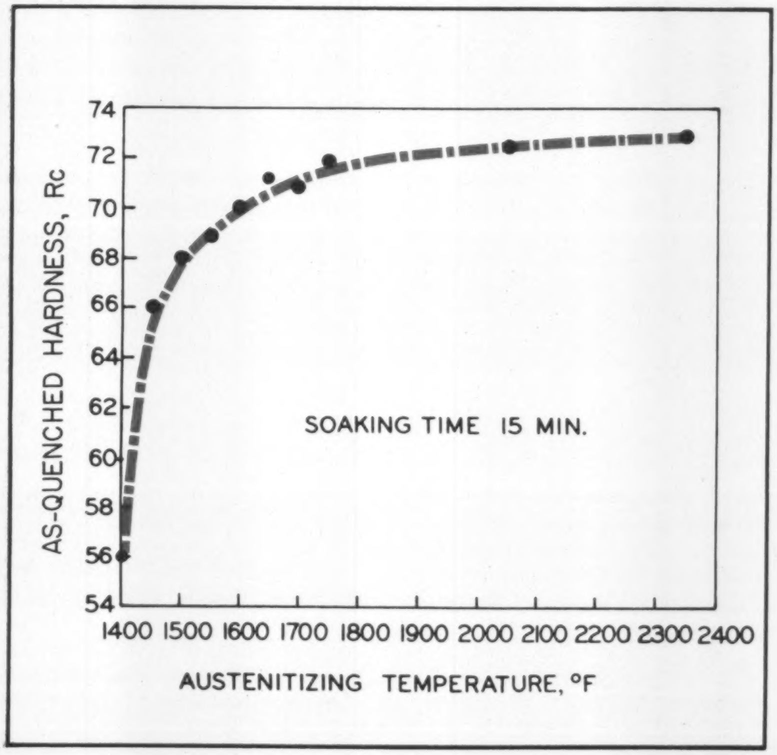
Ti	26
C	6.5
Cr	1.8
Mo	1.8
Fe	Balance

Hardness:	
Annealed	38-43 Rc
As quenched	68-71 Rc
Density	6.58 - 6.65 g/cu cm
Modulus of Elasticity	44 x 10^6 psi
Compressive Strength	360,000 psi

Coefficient of Thermal Expansion

TEMPERATURE RANGE °C	COEFFICIENT OF EXPANSION
20 - 200	7.8 x 10^{-6}/°C
20 - 300	8.7 x 10^{-6}/°C
20 - 400	9.1 x 10^{-6}/°C
20 - 500	9.4 x 10^{-6}/°C
20 - 600	9.6 x 10^{-6}/°C
20 - 700	9.8 x 10^{-6}/°C

Austenitizing Level is Factor



Thus, when heat treating a composite structure of steel-bonded carbide and steel, the best austenitizing temperature for the steel can often be used without seriously affecting the properties of the carbide.

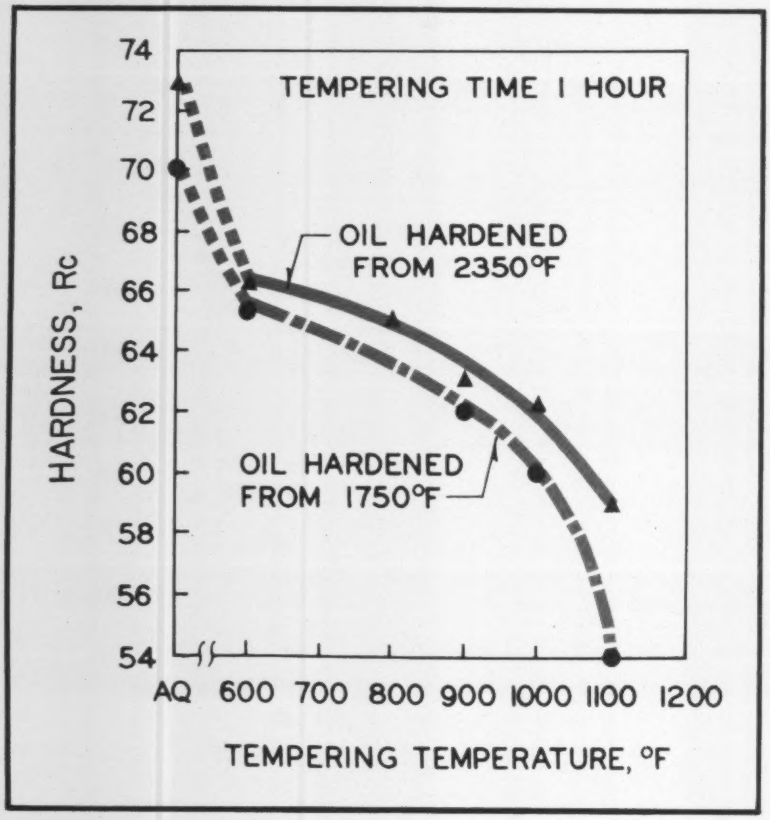
Quenching from 2350°F gives much the same hardness as quenching from 1750°F. There is no evidence of large amounts of retained austenite. Hardening by quenching in oil is usually recommended. Why? Because the hardness achieved by air cooling is generally not enough to impart maximum wear resistance.

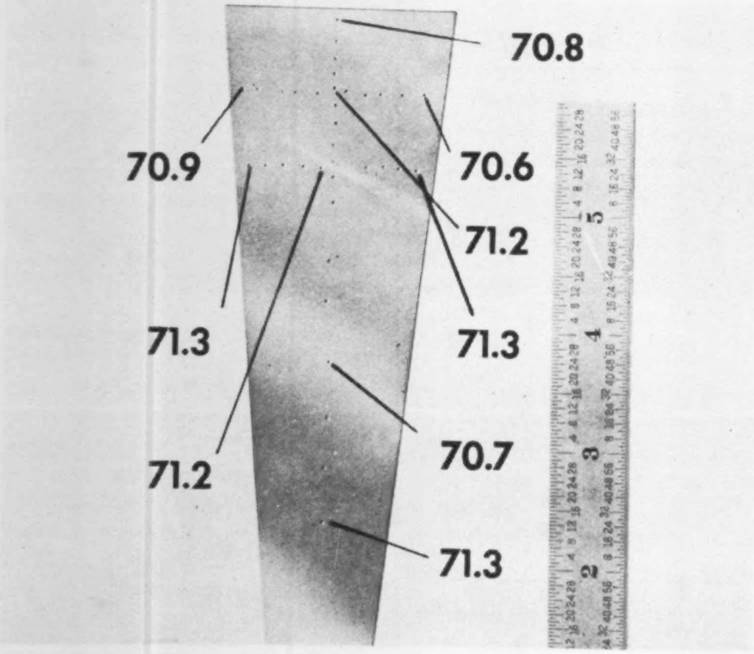
Select the Hardness—For most jobs, steel-bonded carbide is used as-hardened with its maximum wear resistance. Generally, it's stress relieved at 375°F. This step does not appreciably alter the hardness.

When improved toughness is required for heavy blanking and cold heading, tempering at higher temperatures is recommended.

The curve relates tempering temperature to hardness. Note that quenching from 2350°F gives only slightly higher hardnesses than those

Tempering Affects Hardness





SHOWS HARDENABILITY: Section through center of a hardenability cone of steel-bonded carbide shows Rc hardness values at different positions.

obtained by quenching from 1750°F. However, this improvement in hardness is not enough to warrant higher austenitizing temperatures.

The tempering data indicate that this material softens fairly rapidly at higher temperatures. Thus, it is not generally recommended for use in those jobs which generate large amounts of heat.

In Wide Use—A number of components have been made with this steel-bonded carbide. Consider, for example, a stainless steel hinge with curled tabs.

Normally, a tool-steel die is used for trial forming of the desired curled tabs. Adjustments are made if needed. After final tool design is established, a cemented-carbide die for production is made.

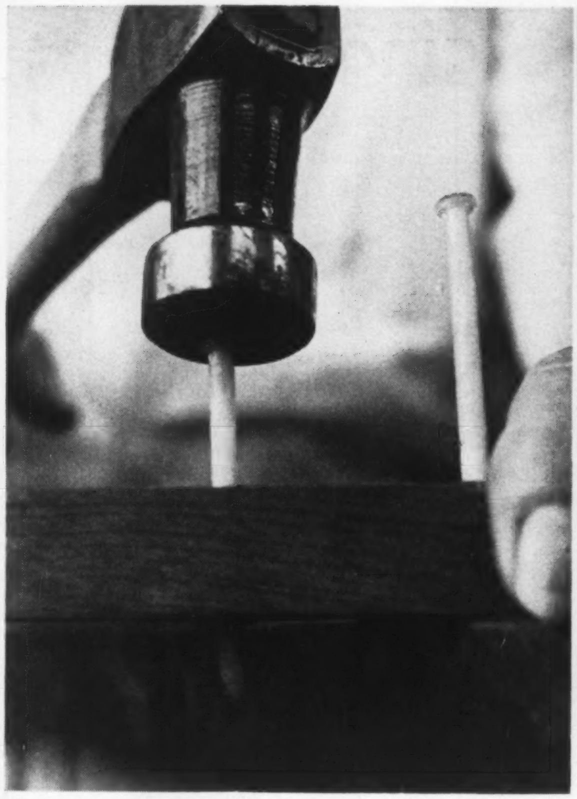
But, when using a steel-bonded carbide only one die need be made. Adjustments can be made in the unhardened state. Once the correct design is established, the tools are hardened and used in production.

Gives Long Life—Another job for steel-bonded carbide dies and punches is for compacting ceramic electrical parts. Punches and dies were produced to final size in the annealed state. Dimensional changes which took place during heat treatment were so small that the tools could be used after hardening without any further finishing.

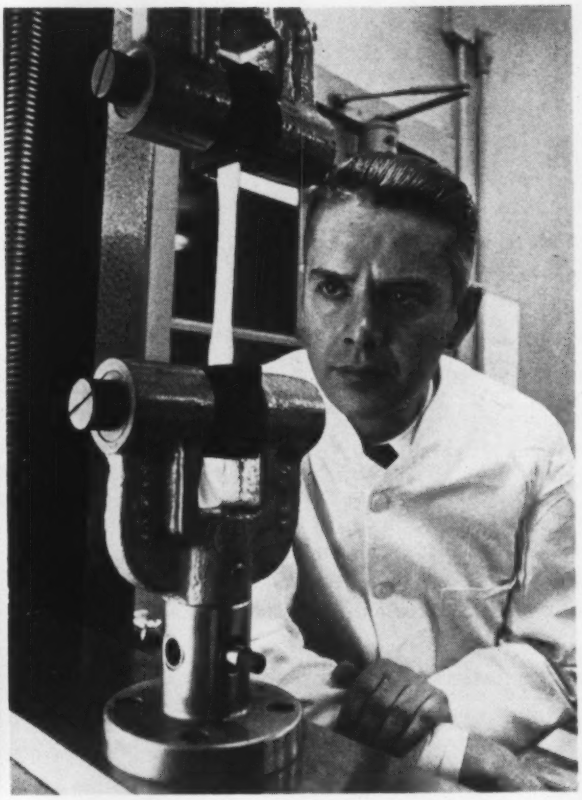
After 1,000,000 compacting cycles, the dies and punches showed no significant wear. Compare this to a high-carbon, high-chromium tool set which lasted for only 100,000 compacting cycles.

SAE 1010 steel has been deep drawn into a shell with a steel-bonded carbide draw die. Over 1,000,000 pieces were produced without reworking the die. In the past, when using a high-carbon, high-chromium steel die, frequent reworking was needed.

Though a number of other mechanical and tool parts have been made with this steel-bonded carbide much investigative work remains to be done. There are many combinations of carbides and steels which bear further study.



RUGGED TEST: Plastic nails made from the high-strength copolymer are driven through a wooden block.



GOOD STRENGTH: Tensile properties include a yield strength of 8800 psi with 12-pct elongation at yield.

Strong Plastic Shapes Easily

Easily fabricated, a tough new plastic resists friction, abrasion and impact loads.

This high-strength material also has a nice appearance.

▪ Tests prove the value of a new high-strength plastic. Called Celcon, this highly-crystalline linear copolymer is easily extruded into complex shapes. It also can be fabricated by injection and blow-mold methods.

Celcon boasts all the qualities desired in a high-strength engineering plastic. These inherent qualities include: Hardness, stiffness, dimensional stability, light mass and resistance to abrasive and environmental attacks.

Ready to Flow—The new plastic, made by the Celanese Corp. of America, Linden, N. J., is supplied as translucent-white free-flowing pellets. These ⅛-in. diam pellets come in lubricated or unlubricated grades.

Even at elevated temperatures, parts made from Celcon handle heavy loads for long periods of time.

A major market for Celcon will be decorative and functional parts for automobiles. Other uses center on machinery gears and bushings, pump housings, conveyor-belt sections, and a host of other industrial and consumer products.

Corner the Market? — Harold Blancke, Chairman of Celanese, reports: "Celcon is ideal for many applications in the new rapid-growth areas for plastics. The total market for high-performance plastics will triple in the next 3 years. This market should reach 200-million lb per year by 1970."

Existing extrusion equipment can be used to process Celcon. Molding heat ranges from 350°-485°F. Molding in the 390°-440°F range insures the best balance between the optimum working cycle and the parts' properties and appearance.

You can saw, drill, buff, polish and turn the new plastic. In general, tool speeds and feeds similar to those used for brass prove most effective. When working at high production rates, coolants are needed.

Robot Handles Forging Job

Unit Never Tires on Other Chores

More than 200 discrete movements can be programmed into a robot — omitting the coffee break—to carry out a multitude of metalworking jobs.

Here's one unit that demonstrates its versatility, speed and vigor.

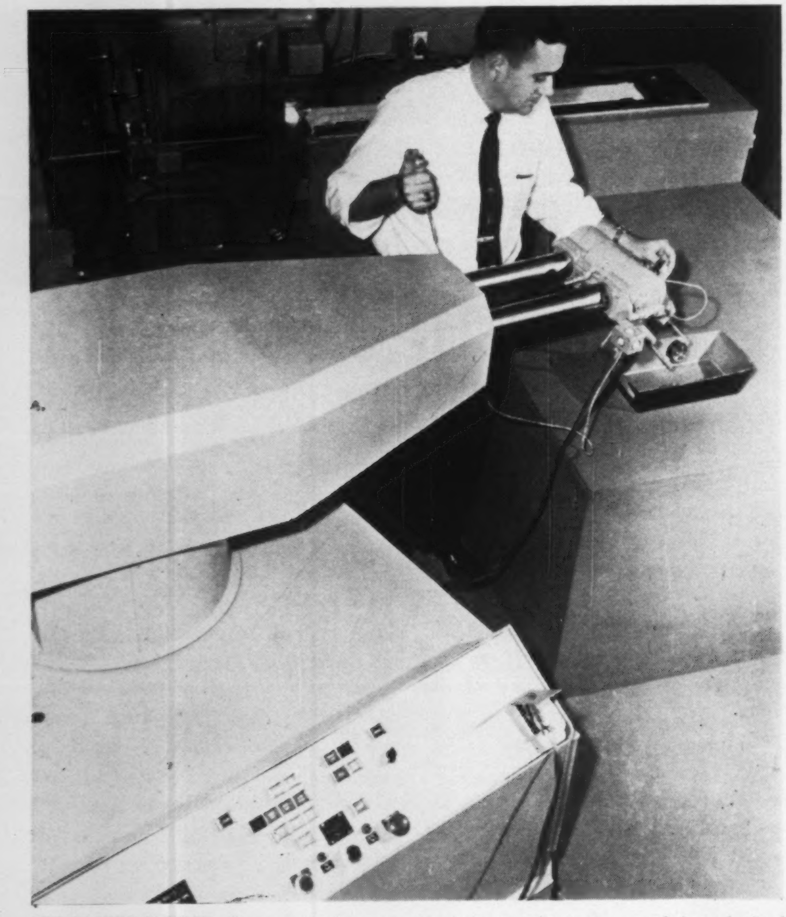
▪ A labor replacement concept provides industry a new term and a new machine. The term is Unimation. The machine—a robot.

The unit, called the Unimate, has an arm which duplicates the functions of the human arm. Its mechanical brain remembers 200 sequential commands and directs the arm to act in accordance with the stored information.

The robot was designed by Consolidated Controls Corp., Bethel, Conn. to take over repetitive routine jobs. A variety of hands or hand tools, which carry out the chores, are fitted on the arm. To name just a few, there are clamps to pick up and move objects, pneumatic wrenches and screwdrivers, and paint spray guns.

Speeds To Feed

Radial velocity	**30 ips**
Vertical velocity	**50 ips**
Rotational velocity	**110 deg/sec**
Wrist bend velocity	**110 deg/sec**
Wrist swivel velocity	**110 deg/sec**



FINE STUDENT: Programming on the job requires no special technical knowledge. Finger pressure in the desired direction causes the desired action. At each position, the unit's memory drum records the command.

Strong Possibilities—Recently, at Consolidated, the robot performed a few routines. First a tote board holding a group of lead billets was placed on a workbench within reach of the machine. The unit unerringly picked up each billet and placed it on a moving conveyor belt.

In a simulation of heavier work handling, Unimate moved 2-ft long, 16-lb steel cylinders from the bottom of one chute and placed them on top of another, as might be required in loading a heat-treating furnace.

To show how a robot might be used to operate a machine tool, in this instance a forging press, the unit removed a metal billet from a conveyor chute, carefully placed it on a die in the press and then actuated the press.

After the press had closed and opened, the unit picked up the billet, turned it over and placed it on a second-stage die. It then picked up a new billet and put it on the first die. After actuating the press again, the robot removed the finished piece from the second die and dropped it in a box. The routine continued automatically.

Almost Human—Unimate bears little physical resemblance to human beings. It looks more like a miniature gun turret on a fighting ship. A box-like base contains all of the control and operating mechanisms. From the pedestal a central column rises. From the top of this column the arm extends.

Hydraulically operated, the arm can telescope in length from 3 to 7 ft. In a horizontal plane, it can sweep an arc of 220°; in a vertical plane, 60°. With its arm fully extended the unit can reach from within 4 inches of the floor to 90 in. above the floor. All told, the unit can grasp objects within a swept volume of 350 cu ft.

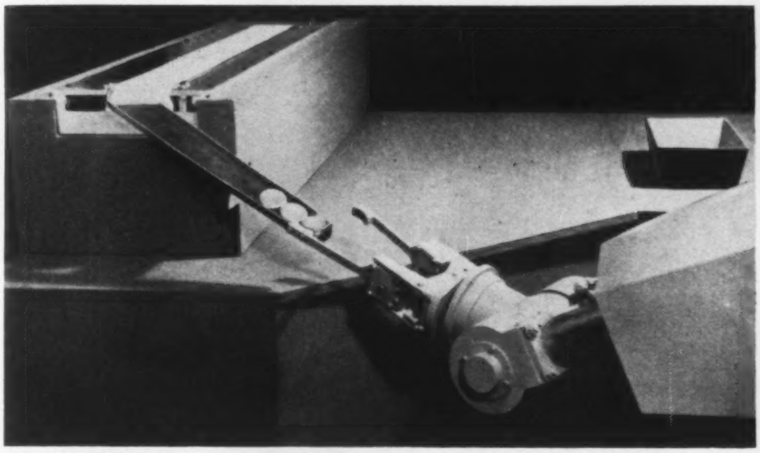
At the end of the arm is a "wrist" which, like a human wrist, can both bend and rotate. The wrist joint is terminated in a hand designed to grasp a particular object. Since the hand is pneumatically operated, the pressure with which it grasps an object can be controlled by varying the air pressure supplied. Thus, the robot can grasp fragile as well as heavy objects.

Good Memory—The "brain" is a patented magnetic memory drum which can be "read" while standing still. Its surface consists of segments of magnetic material which can be either magnetized or de-magnetized in a pattern conforming to instructions. These instructions are recorded when the arm is being led through a task for the first time.

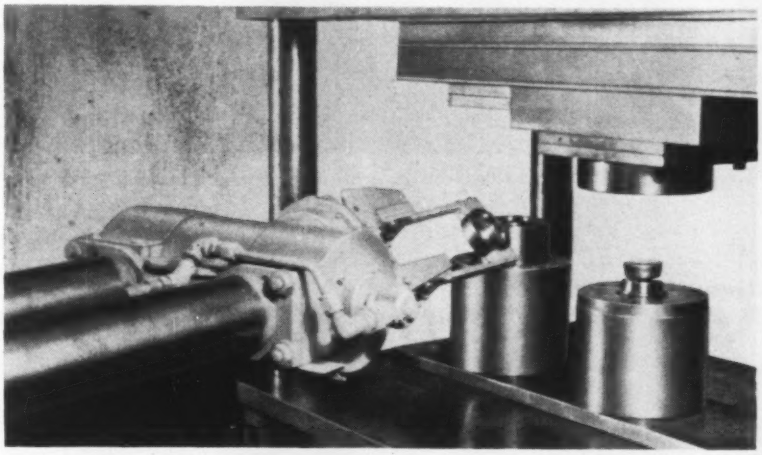
Since the drum does not have to rotate to present its readings, it simply steps from one position to the next and waits for a signal that the arm has assumed a corresponding position before the next set of positioning instructions.

In addition to controlling the arm and hand, the memory drum also can control external devices. For example, after feeding a punch press it can actuate the press when the hand has withdrawn.

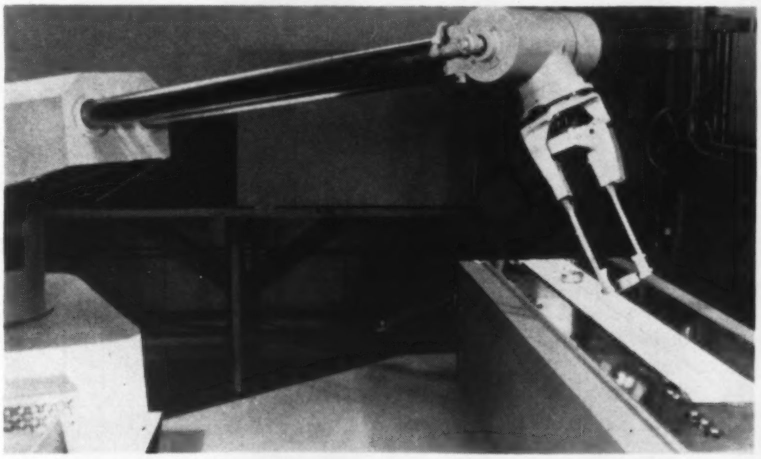
The Unimate can handle 25 to 75 lb objects faster than most human beings. The unit is entirely self-contained. The owner simply moves it into position with a fork lift truck, plugs it in, teaches it its first chore and walks away.



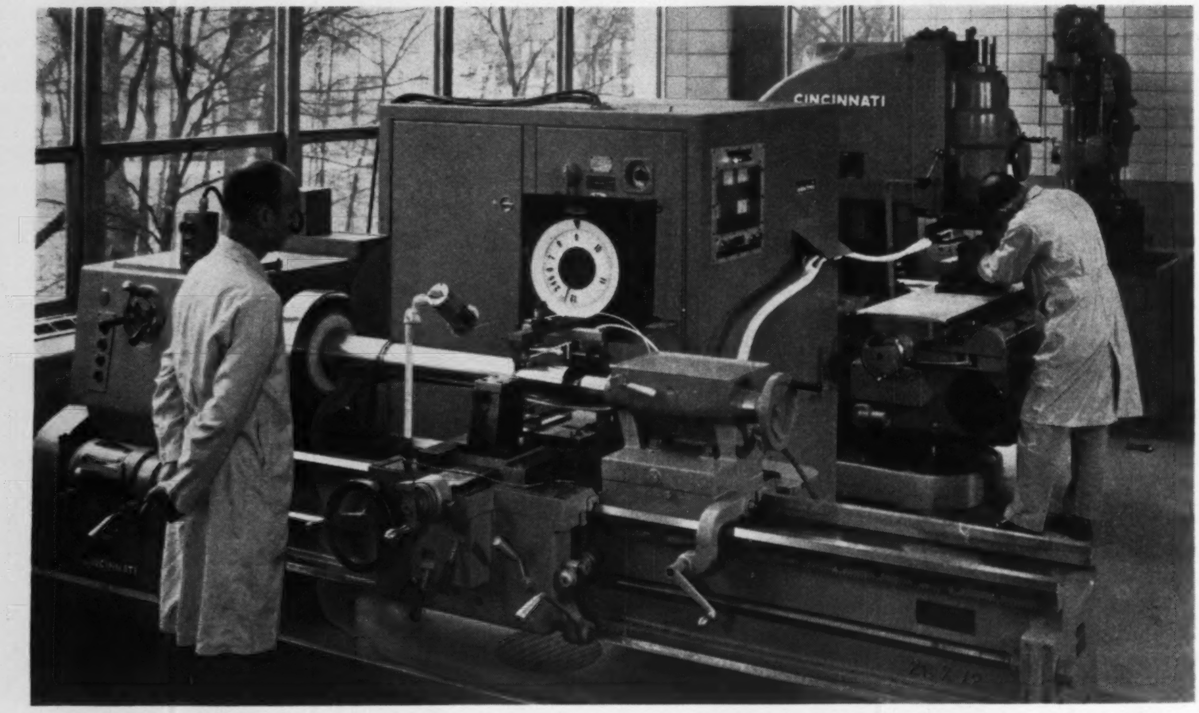
FIRST STAGE: The unit removes a metal billet from a conveyor chute. The robot places the billet on a die and then actuates the press.



TWO STAGE FEED: The robot picks up the pressed billet, turns it over, and places it on a second stage die. The unit then places a new billet on the first stage die and again actuates the press automatically.



FINISHED PART: The robot removes the finished part and drops it in a box. The unit will keep working until the job's completed.



EXTENDED STUDY: Research is now working on the ability of many alloys to respond to hot machining.

Can Hot Machining Techniques Keep Pace With New Alloys?

One of the most difficult problems in machining today is how to handle the new family of Space-Age materials.

Hot machining could be the technique to tackle the job.

▪ The growing use of high-temperature alloys was quite evident in 1957. More of these materials were going into service every day. At the same time, however, metal removal rates in production were steadily decreasing. Could the use of heat (as an aid to machinability) stop this trend?

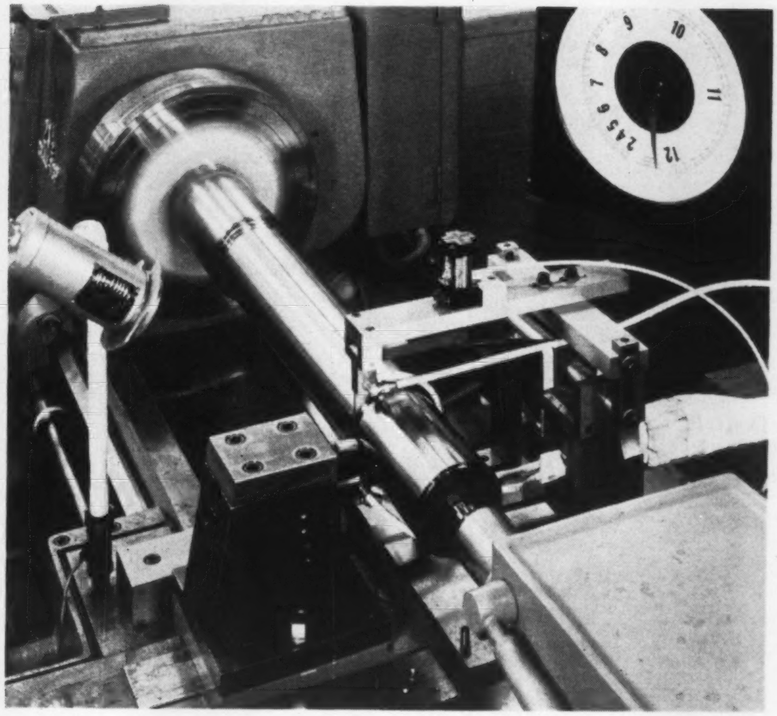
Four years ago, a group of research engineers studied this possibility under the banner of "elevated temperature machining." Their results were so promising that the U. S. Air Force sponsored and supported an extension of the research program.

Carried out by engineers in the Physical Research Dept. of The Cincinnati Milling Machine Co., Cincinnati, the program focused on three main objectives. The first area was to study the influence of raising workpiece temperature on machinability. Also, what effect would this change have on the basic process of chip formation?

Other Targets—A second goal was to find controlled heating methods which would be suitable for metal cutting jobs. The engineers also planned to measure the effects of hot machining on both the metallurgy and geometry of the workpiece. Tests were performed using milling, turning and drilling.

The results are encouraging. Hot machining can greatly improve production rates in cutting high-strength materials. Available heating techniques can be used for roughing operations, although the workpiece might distort slightly. Through-the-tool methods of heating show promise of reducing the distortion problem, making finishing steps more practical.

Three types of alloy steels were selected for the tests. They included low-alloy martensitic, semi-austenitic precipitation-hardening stainless and hot-work die steels. All of these steels were heat treated to high



LESS DAMAGE: Radio-frequency heat reduces thermal damage to work.

strengths in the hardness range of 350-600 Bhn.

Future Aspects—Research is still going on in other areas. Studies of nickel- and cobalt-base alloys along with refractory metals are now in progress.

The basic idea behind hot machining is twofold. First of all, the higher workpiece temperature tends to reduce the shear strength of the material. At the same time, chip formation by plastic deformation on the shear plane ahead of the tool becomes easier.

Chips formed by hot machining resemble smooth, continuous ribbons. Machine the same metal at room temperature and your chips will be segmented. Once the workpieces are heated to about 1000°F, tool forces start to drop 33-66 pct.

Heat Buildup—Cincinnati Milling also measured the mean tool temperatures at the tool-chip interface. Although this area did display an increase in heat, it was not, in general, so pronounced as the temperature of the workpiece itself.

How about the relationship between cutting speed and tool life? The graph on turning shows good results. Carbide tools were used on 4340 steel (600 Bhn) at room temperature, 300°F, 600°F and 900°F. At the highest temperature, cutting speed was 170 fpm. Tool life was 20 times longer.

On the other hand, suppose you want a 20-minute tool life with the throwaway-type tool used. Then the cutting speed can be raised from 95 fpm at 76°F to 205 fpm at 900°F.

Hot face milling displayed equally good results. Here, tool life was 20 times better simply by raising the temperature of Thermold J die

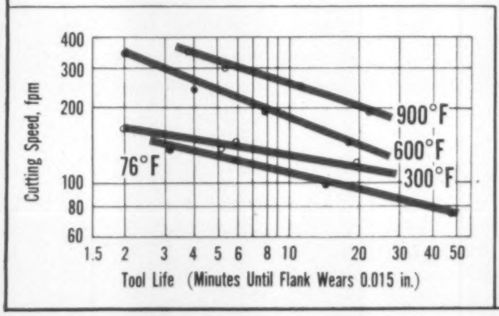
Machinability Responds at Higher Temperatures

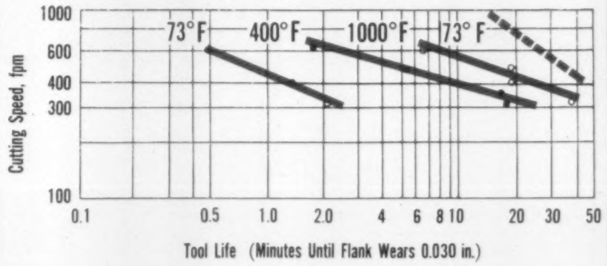
Turning

Heating Method: Induction
Material: 4340 Steel (600 Bhn)
Depth of cut: 0.100 in.
Feed per rev.: 0.008 in
Tool: Carboloy 350

Face Milling

Heating Method: Induction
Materials: --C1018 Steel (150 Bhn)
—Thermold J die steel (390 Bhn)
Depth of cut: 0.125 in.
Feed per rev. 0.0065 in.
Tool: Single-tooth cutter, 370 carbide





steel (390 Bhn) from 73°F. to 1000°F.

Hot drilling of AM350 (440 Bhn) stainless with high-speed-steel drills achieved limited success. The ideal workpiece temperature in drilling this alloy is around 300°-350°F. At a cutting speed of 29 fpm, engineers were able to drill three times as many holes than at room temperature before drill failure.

A Better Method—The search for a useful heating method was prompted by the extent of thermal damage to the workpiece. Hot machining has made use of such methods as flame heating, furnace heating, resistance heating, arc and even induction heating.

Researchers agreed that the most ideal method should heat only the shear zone or the zone where the chip is formed. Thermal damage is apt to result when other areas are heated.

Twin Electrodes—As a result, a radio-frequency resistance-heating setup was devised. Two electrodes, one above and one below the tool, transfer the current to the workpiece. Radio-frequency current follows the path of least impedance. Proper placement of the return conductor puts the path just ahead of the cutter.

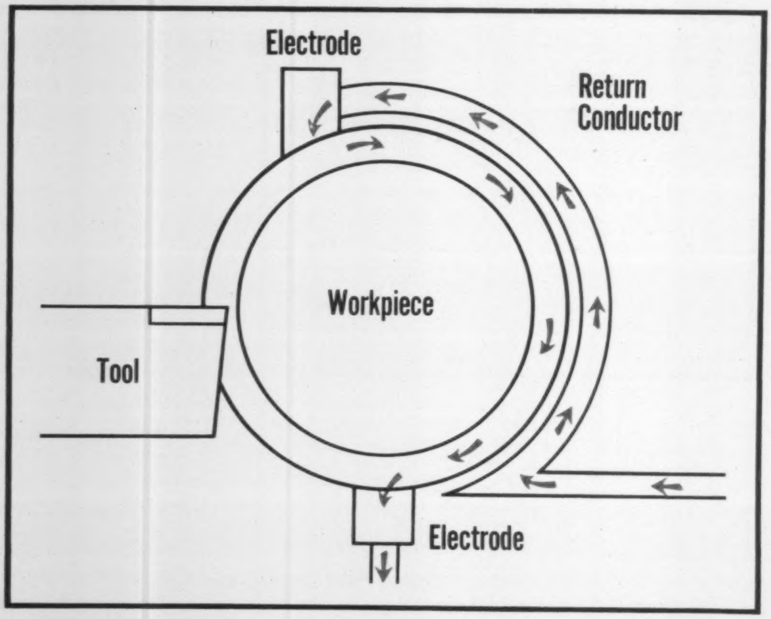
How did this new method compare with other heating techniques? On a section of AISI 4340 (an alloy that is highly susceptible to thermal damage), there was less loss in hardness. In addition, the tempering effect didn't penetrate as deeply. Distortion was reduced to one-third and no microstructural change in the workpiece was noted.

Another promising technique is through-the-tool radio-frequency heating. In this method, the current flows from the chipbreaker, down the chip, to the zone of shear, and then out past the flank of the tool to an electrode mounted below. By introducing the current into the shear zone, then removing it, little heat passes into the workpiece.

CINCINNATI

CHECK ON PROGRESS: Oscilloscope provides means for observing tool temperatures to obtain machinability data on hot milling.

How R-F Method Supplies Heat



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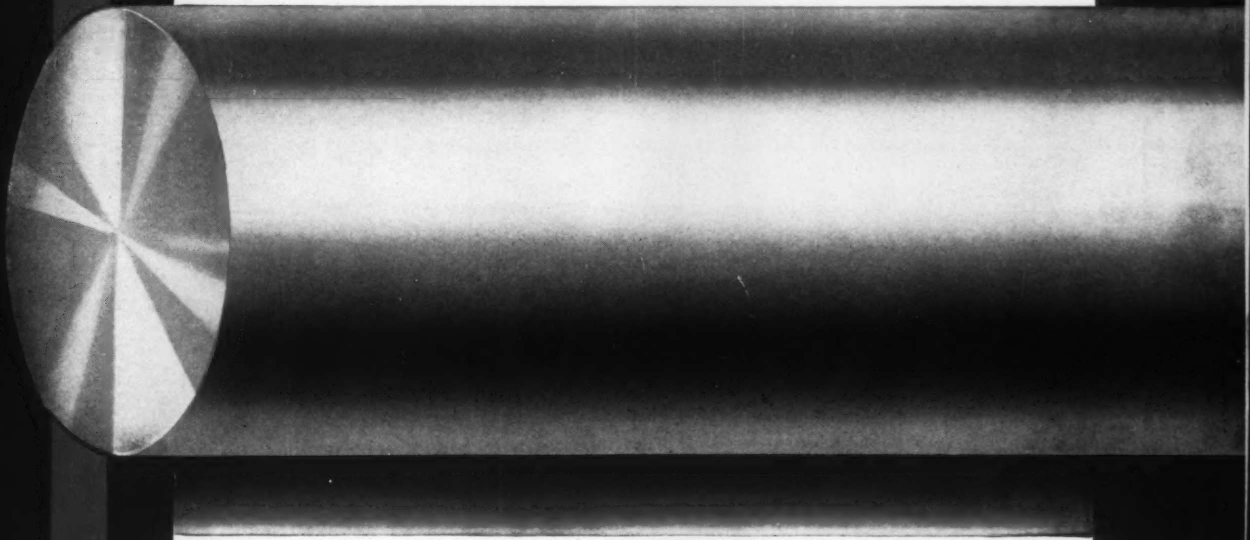
e.t.d. 150 Alloy has 150,000 psi tensile guaranteed! (Rockwell C32 minimum)

e.t.d. 150 Alloy machines better than heat treated alloy steels!



Here are cost-reducing advantages

(1) Heat treating problems, costs (and secondary operations) are eliminated. (2) "e.t.d." 150 machines better than heat treated in-the-bar alloy steels. (3) Tool life and finish are excellent. (4) No quench cracks or distortion from heat treatment. (5) "e.t.d." 150 has exceptional strength and hardness uniformity across the bar. (6) End cost of parts is greatly reduced.

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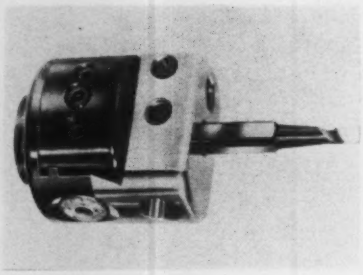
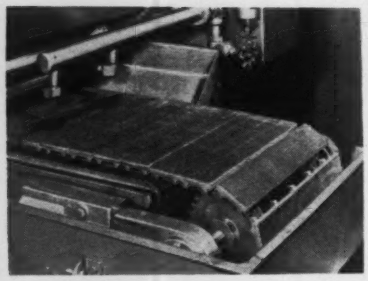


Boring Head Speeds and Simplifies Setups

A precision-constructed boring head features three boring-bar holes, dial-screw graduations for direct reading and interchangeable shanks. To simplify and speed setups, the boring heads have two vertical boring bar holes plus a cross hole for rigid tool positioning and holding. Tools are simply locked into position by easily - accessible lock screws. A completely enclosed dial screw provides accurate adjustments which are read directly from the micrometer dial. Threads are ground after hardening. (Lido Tools)

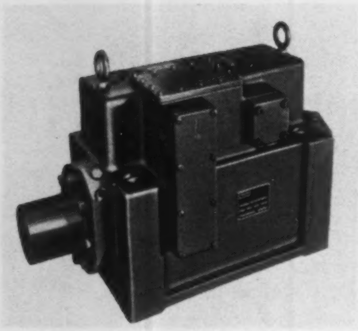
For more data circle No. 21 on postcard, p. 107



Chain-Block Conveyor Aids Surface Grinding

With a new chain-block conveyor, it's possible to grind almost any shape on a belt grinder. The conveyor drive reciprocates. In effect, it provides a surface grinder that grinds the full width of the table at one pass. The solid base of the chain blocks makes close tolerances possible. If the chain blocks are covered, they will operate as an endless conveyor for grinding, polishing and buffing flat parts. Fast belt changes make it economical to do many jobs on one machine. (Sales Service Mfg. Co.)

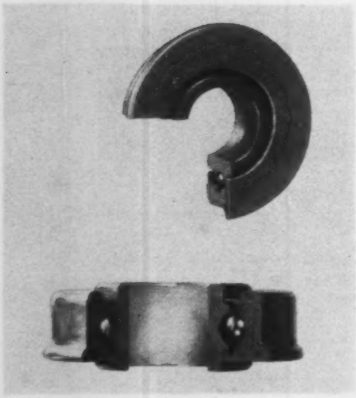
For more data circle No. 22 on postcard, p. 107



Two-Stage Servo Valves Regulate Cold Mill

High-pressure servo valves insure precise control at pressures up to 3000 psi. These valves deliver 250 gpm. At top capacity, pressure drop is less than 1000 psi. In a new installation, two of these valves connect to the screwdown-power cylinders of a two-high, non-reversing, cold mill processing steel plate 0.005-0.120 in. thick to within 2 pct of the size selected. Two 200-hp electric motors drive the hydraulic-system pumps, each rating 108 gpm at pressures up to 3000 psi. These pumps charge accumulators for high-speed operation of the power cylinders. Each valve is 24 in. long, 12 in. wide, 14 in. high, and weighs about 500 lb. (Oilgear Co.)

For more data circle No. 23 on postcard, p. 107

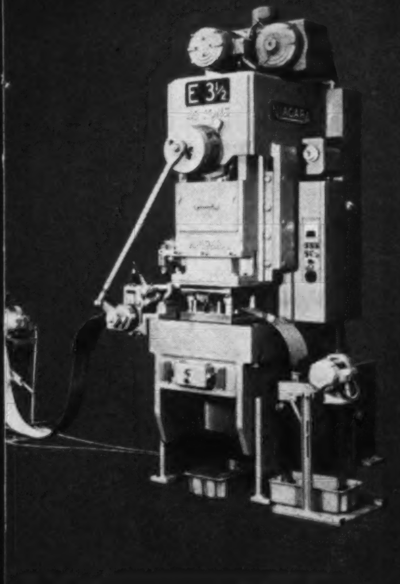


Unground Bearings Solve Misalignment Problems

If you force most bearings on shafts, misalignment and unbalance usually result. A new line of unground bearings is the answer to these headaches. Low in cost, these bearings boast a 15-microinch finish. They operate efficiently at speeds in excess of 2000 rpm. A locking compound secures the loose slip-fit bearings on their shafts. Shaft surfaces need not be ground. An unhardened steel jacket holds the two-piece, hardened outer races together. This jacket absorbs 0.003-0.004 in. compression when the bearings are pressed into a nest or housing. Each half of every race is only 90 pct solid. This allows the shapes to withstand standard or heavy-duty heat treats with little distortion. (Lundquist Tool & Mfg. Co.)

For more data circle No. 24 on postcard, p. 107

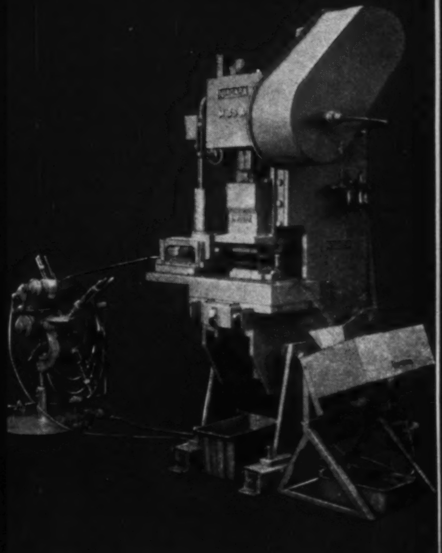
PRECISION PARTS BY THE MILLIONS



SERIES E — FRONT-TO-BACK CRANKSHAFT OBI's
Capacities: 45 to 200 tons.
45-ton model (above) stamps out fuse tips
at rate of million/day.

NIAGARA
SA2-100-36-30

SERIES SA-2 STRAIGHTSIDE AUTOMATICS
Capacities: 25 to 300 tons.
100-ton package (above) includes double
roll feed, stock reel, scrap cutter.



SERIES M — ULTRA-HIGH SPEED OBI's
Capacities: 22 to 60 tons.
35-ton model shown operates at adjustable
speeds up to 1000 spm and produces
parts at rate of million/day.

3 great Niagara lines excel in automatic, high speed, progressive die work

Premium construction: It's the key to premium performance here! These modern Niagara presses are designed strictly for automatic, high speed, progressive die work.

Model for model, they'll turn out more parts per hour than conventional presses of equivalent tonnage can even approach. Far heavier and more massive, they have the ruggedness, rigidity, and stamina to run vibration-free at high speeds.

Providing more guiding surface, their gibbing holds slide and bed in precise alignment for precise production, longer periods between die grinds, and longest possible die life.

But this just begins to tell the story . . .

YOU'RE INVITED TO CHECK all the features of these production-boosting machines. Illustrated Bulletins 54 (Series M), 56 (Series E), and 264 (Series SA-2), will be mailed on request. Write: Niagara Machine & Tool Works, Buffalo 11, N. Y.

NIAGARA

America's most complete line of presses, press brakes, shears, other machines and tools for plate and sheet metal work.

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Connecticut Mall. Castings Co., New Haven 6
Eastern Malleable Iron Co., Naugatuck

DELAWARE
Eastern Malleable Iron Co., Wilmington 99

ILLINOIS
Central Fdry. Div., Gen. Motors, Danville
Chicago Malleable Castings Co., Chicago 43
Moline Iron Works, Moline
Moline Malleable Iron Co., St. Charles
National Mall. and Steel Castings Co., Cicero 50
Peoria Malleable Castings Co., Peoria 1
Wagner Castings Company, Decatur

INDIANA
Albion Malleable Iron Company,
Muncie Division, Muncie
Link-Belt Company, Indianapolis 6
National Mall. & Steel Castings Co., Indianapolis 22

IOWA
Iowa Malleable Iron Co., Fairfield

MASSACHUSETTS
Belcher Malleable Iron Co., Easton

MICHIGAN
Albion Malleable Iron Co., Albion
Auto Specialties Mfg. Co., Saint Joseph
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Central Fdry. Div., Gen. Motors, Saginaw

MINNESOTA
Northern Malleable Iron Co., St. Paul 6

MISSISSIPPI
Mississippi Malleable Iron Co., Meridian

NEW HAMPSHIRE
Laconia Malleable Iron Co., Laconia

NEW YORK
Acme Steel & Mall. Iron Works, Buffalo 7
Frazer & Jones Company Division
Eastern Malleable Iron Co., Solvay
Oriskany Malleable Iron Co., Inc., Oriskany
Westmoreland Mall. Iron Co., Westmoreland

OHIO
American Malleable Castings Co., Marion
Central Fdry. Div., Gen. Motors, Defiance
Dayton Mall. Iron Co., Ironton Div., Ironton
Dayton Mall. Iron Co., Ohio Mall. Div., Columbus 16
National Mall. and Steel Castings Co., Cleveland 6

PENNSYLVANIA
Buck Iron Company, Inc., Philadelphia 22
Erie Malleable Iron Co., Erie
Lancaster Malleable Castings Co., Lancaster
Lehigh Foundries Company, Easton
Meadville Malleable Iron Co., Meadville
Pennsylvania Malleable Iron Corp., Lancaster

TEXAS
Texas Foundries, Inc., Lufkin

WEST VIRGINIA
West Virginia Mall. Iron Co., Point Pleasant

WISCONSIN
Belle City Malleable Iron Co., Racine
Chain Belt Company, Milwaukee 1
Federal Malleable Company, Inc., West Allis 14
Kirsh Foundry Inc., Beaver Dam
Lakeside Malleable Castings Co., Racine
Milwaukee Malleable & Grey Iron Works, Milwaukee 46

These companies are members of the Malleable Castings Council

DESIGN DIGEST

Aids Reamer Accuracy

For stub-screw machine reamers, a new line of reamer bushings reduces misalignment problems. The reamer bushings correct such problems as: out-of-parallelism of turret and spindle, inaccurate indexing, and even hole-runout in the workpiece. They allow closer tolerances —only the reamer flouts. They also shorten machine setup and replacement time. (Mueller Industries)

For more data circle No. 25 on postcard, p. 107

Limit Switch

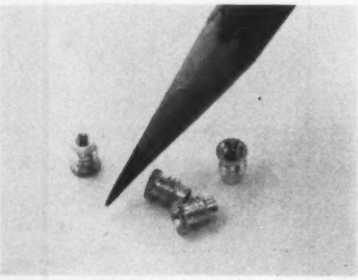
Suitable for hazardous locations, an explosion-proof limit switch conforms with UL standards. The housing of the switch is a rugged, heavy-duty non-sparking aluminum casting with metal-to-metal seal. The switch mechanism attaches to the cover and plugs into the terminal block in the base. Mechanical features include short trip differential, extreme repetitive accuracy, liberal safety overtravel and light operating force to trip. (R. B. Denison Mfg. Co.)

DENISON
LOXSWITCH
LIMIT SWITCH FOR HAZARDOUS LOCATIONS

For more data circle No. 26 on postcard, p. 107

Small Fastener

Designed for use in areas of reduced edge distance, this fastener needs only one simple tool for installation or replacement. It combines welcome features of miniaturization in a one-piece insert, which is easily placed and locked in the parent material without complicated methods of installation and removal. It's made in sizes 0-80, 1-64, 1-72, 2-56, 3-48 and 4-40 and in a variety of materials including steel, stainless steel and brass. An optional thread locking feature is also available. (Components Engineering and Manufacturing Co.)



For more data circle No. 27 on postcard, p. 107

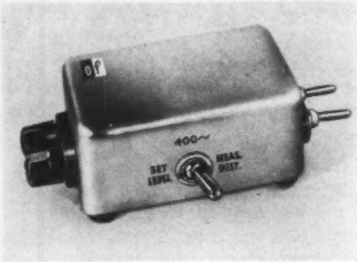
Air Bearings

Newly developed are two unique, air-lubricated bearings that hold promise for a wide range of future military and space transportation uses. One bearing, a hydrodynamic or rotating-type cylinder, generates its own air film when rotated at high speeds. The other, a hydrostatic type, is made from a porous, sintered, powdered metal through which pressurized air is used to form a lubricating film. (Chrysler Corp.)

For more data circle No. 28 on postcard, p. 107

Measures Distortion

Recently developed, a new distortion measuring filter permits accurate distortion measurement of an ac signal when used in conjunction with a vacuum tube voltmeter. It eliminates the need for a distortion analyzer. The harmonic content can be viewed on an oscilloscope. (Ortho Filter Corp.)



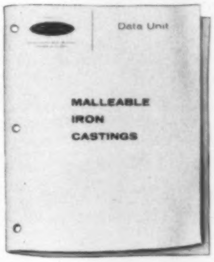
For more data circle No. 29 on postcard, p. 107

New Cars and Trucks Use More Malleable For Better Performance...Lower Cost

As the automotive industry steps up its drive to pack greater performance into lighter weight vehicles and still hold costs in line, the demand for Malleable iron castings continues to increase. Noted for their strength, toughness, machinability and economy, Malleables are used as key components in every make and type of vehicle.

Matching each new advance in automotive technology, Malleable is now available in a broad range of properties, including tensile strengths from 50,000 to 120,000 psi!

Find out now how much Malleable castings can improve your products. Contact any company that displays this symbol —

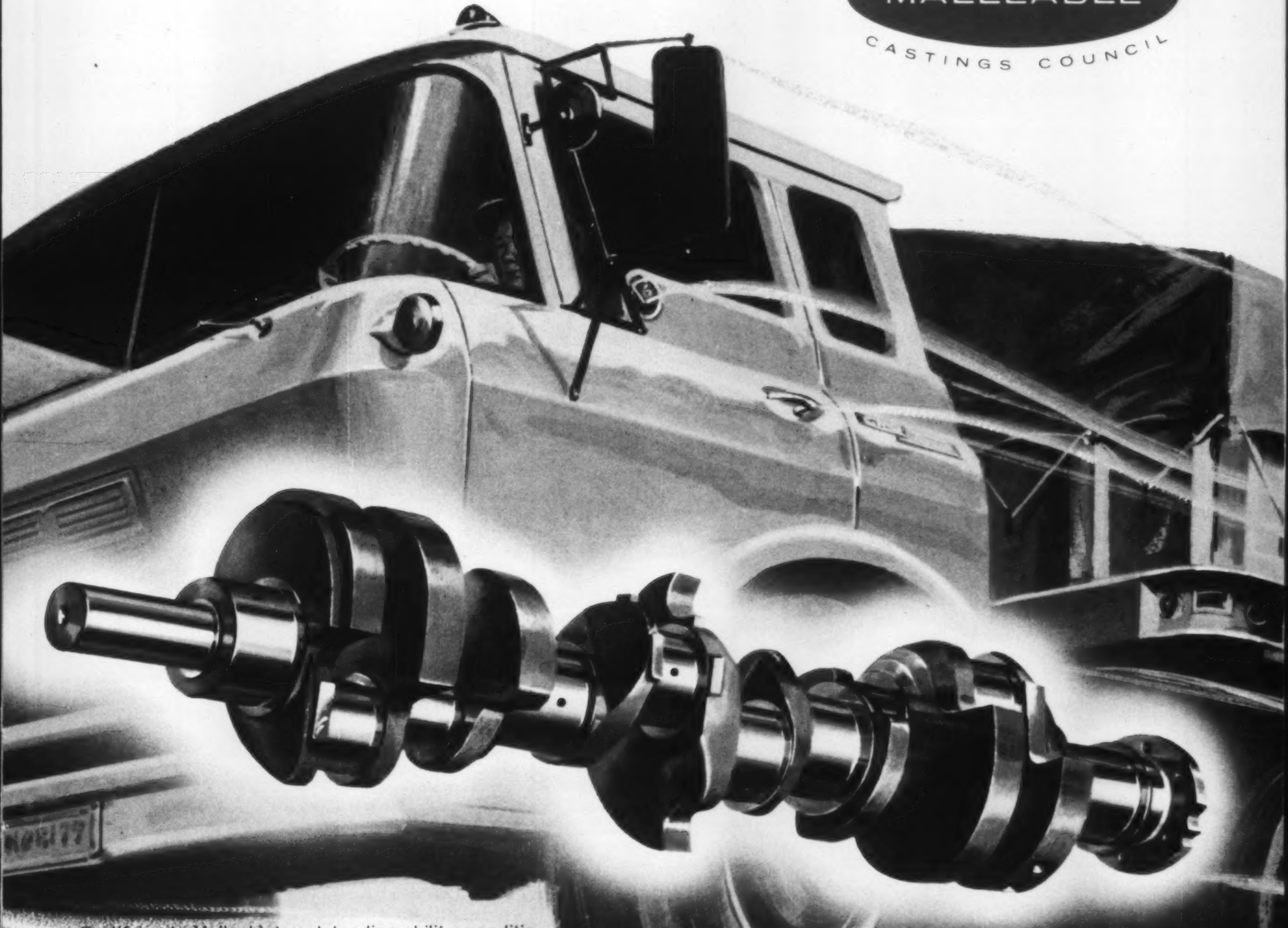


Data Unit

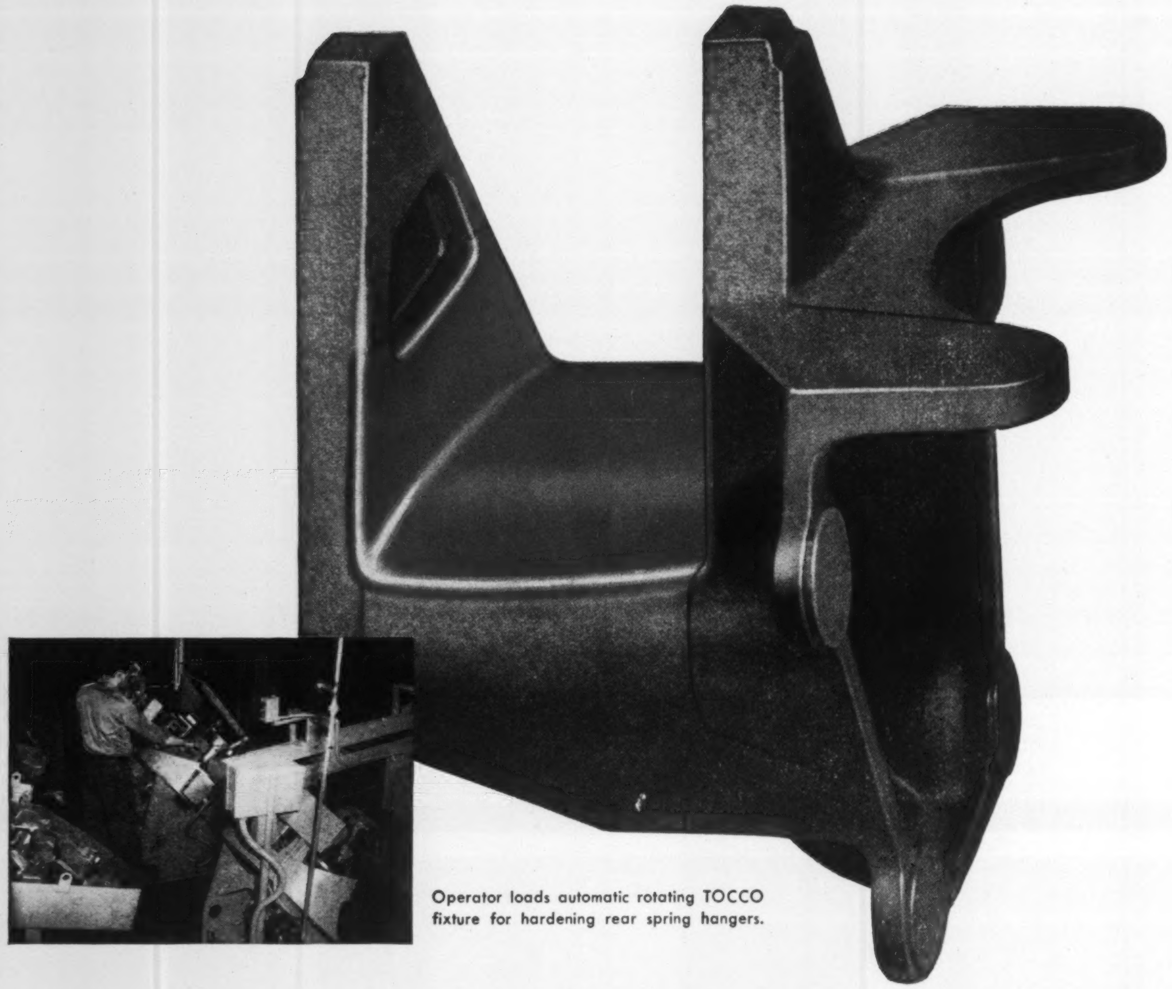
MALLEABLE
IRON
CASTINGS

For Free Literature on advantages of Malleable iron castings, with examples from the automotive industry, ask any member company for Data Unit No. 113, or write to Malleable Castings Council, Union Commerce Building, Cleveland 14, Ohio.

MEMBER
MALLEABLE
CASTINGS COUNCIL



Testifying to Malleable's outstanding ability, pearlitic Malleable iron crankshafts are now used in both cars and trucks, like this new heavy-duty highway hauler. Pearlitic Malleable was chosen for its high strength, wear resistance, damping capacity and machinability . . . Malleable is the most machinable of all ferrous metals of similar properties.



Operator loads automatic rotating TOCCO fixture for hardening rear spring hangers.

The job they said "couldn't be done"

now being hardened—1 every minute

with TOCCO* Induction Heating

This unusually shaped part is a rear spring hanger used in the spring suspension system of a major truck manufacturer. The hardness pattern covers the "flat" section, which actually isn't flat but blends two widely varying radii, and the sides or "ears" a portion of which must be hardened to the same depth—.060″ to .090″. Nine of these irregularly shaped castings are loaded in a rotating fixture and scanned progressively by a TOCCO inductor block at the rate of one per minute. An air gap of .060″ is maintained between the inductor and the part—quite a tricky achievement since the spring hangers are unmachined castings with normal foundry tolerances of ±.045″.

This job is typical of many where TOCCO engineers have worked out a satisfactory and reliable production setup for a supposedly impossible heating job. If you have a difficult heating job—hardening, brazing, soldering or heating for forming or forging it will pay you to consult TOCCO—without obligation, of course.

TOCCO

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U.S. Pat. Off.

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Please send copy of "Typical Results of TOCCO Induction Hardening and Heat Treating"

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New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy, just circle the number on the free postcard.

Chain Ratings

The new horsepower ratings proposed for adoption to the American Standards Assn. by the Assn. of Roller and Silent Chain Manufacturers, has been issued in a new catalog. The catalog features a unique quick selection chart which simplifies finding recommended chain pitch numbers. (Foot Bros. Gear & Machine Corp.)

For free copy circle No. 1 on postcard

Cleaning Barrels

Five heavy-duty cleaning barrels, with work capacities ranging from 15 to 102 cubic feet, are described in a new bulletin. The bulletin features cut-away drawings, photos and sketches. Specifications and overall dimensions are also outlined. (Pangborn Corp.)

For free copy circle No. 2 on postcard

Packaging Materials

A new File Folder containing a variety of plastic-coated packaging materials is available. The purpose of these samples is to indicate the extensive variety of packaging materials that can be custom processed to meet your specific requirements. (The Marvellum Co.)

For free copy circle No. 3 on postcard

Fork Trucks

Complete specifications on general purpose fork trucks are given in an eight-page bulletin. The two trucks described have capacities of 60,000 and 70,000 lb at 48-in. load centers and are designed for heavy lifting work at steel yards, lumber mills and similar outdoor operations. The bulletin gives details on speed, grades and underclearances; engine and electrical system; power train; brakes and hydraulic systems. (Clark Equipment Co.)

For free copy circle No. 4 on postcard

Welding Stainless

Information concerning techniques for welding stainless steel is contained in a new bulletin entitled "Arc Welding Stainless Steel." This bulletin gives physical properties, structure, and welding characteristics of the different types of stainless steels. It also has a chart listing deposit properties and electrode recommendation tables for the different types of stainless steel. (Lincoln Electric Co.)

For free copy circle No. 5 on postcard

Stops Vibration

A new booklet describes controlling vibration. The eight-page color brochure contains a full description of the specially-engineered felt mounting pads which can be used to dampen vibration in equipment ranging from the most sensitive precision equipment to the heaviest industrial machines. (American Felt Co.)

For free copy circle No. 6 on postcard

Hose Fittings

A color coded eight-page catalog is designed to make the ordering of hose fitting assemblies easier. The catalog covers hose fittings and assemblies that are detachable, reusable and designed for medium and high pressure industrial uses. (The Lenz Co.)

For free copy circle No. 7 on postcard

Mercury Lamps

Technical information on mercury lamps is contained in a new 28-page booklet. The publication contains the latest information

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Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. 3/2/61

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about initial and maintained lumen output, life rating, and essential electrical and physical characteristics of the lamps. In addition, it describes lamp construction, ASA designation, color, auxiliary equipment and application information. (Westinghouse Electric Corp.)

For free copy circle No. 8 on postcard

Stainless Steel

Four page brochure describes new bright annealed stainless steel finish for automotive applications. The process reduces and often eliminates buffing. Continuous roll forming of strip stock makes possible wider variety of complex shapes at substantially lower fabrication cost. The brochure also describes Sharonart, coated products, forging quality, high tensile, spring and special alloys. (Sharon Steel Corp.)

For free copy circle No. 9 on postcard

Gas Analyzer

A completely illustrated bulletin giving specifications and capabilities of a new residual gas analyzer is available in a two-page bulletin. The mass spectrometer type instrument is designed to provide continuous analysis of gas remaining in evacuated systems. It is capable of measuring minute quantities of gas, gaseous mixtures, and vapors over a wide range. (Consolidated Electrodynamics Corp.)

For free copy circle No. 10 on postcard

Wrench Calibrator

A bulletin describes the operation and application of a portable torque wrench calibrator. Designed for checking and setting all types of torque wrenches, the device may be bench-mounted or clamped in a vise, and needs no piping, wiring or other external connections. The unit measures both right and left-hand torque, and is certified accurate within one percent of full-scale reading. (Skidmore-Wilhelm Mfg. Co.)

For free copy circle No. 11 on postcard

Polishing Units

Complete specifications on five different types of automatic polishing and buffing units are offered in five descriptive data sheets. Information includes work capacity, production rates, buff heads, wheels, head adjustment, stand adjustment, motors, controls, work tables and accessories. Machines are of the rotary indexing, continuous rotary, horizontal conveyor and straight line conveyor type. (Packer Machine Co.)

For free copy circle No. 12 on postcard

Office Furniture

A new catalog illustrates a complete line of steel equipment products for business, industry, institutions, homes. It contains product views, complete specifications, and installation views depicting the products in action. (Lyon Metal Products, Co.)

For free copy circle No. 13 on postcard

Special Fixtures

A new folder graphically illustrates and translates into "dollars and cents" for specific items the savings in engineering and design time, paper work and tool room man hours when standard components are designed into a job and ordered from the distributors' stock. (Jergens Tool Specialty Co.)

For free copy circle No. 14 on postcard

Studs and Rods

Details about delivery on short runs of studs and threaded rods in machine screw sizes and large diameters are contained in a new bulletin. Made to blueprint or from stock, J-bolts, U-bolts, anchor-bolts and similar fasteners in stainless steel, carbon and alloy steel, bronze and other metals are also listed. (Star Stainless Co.)

For free copy circle No. 15 on postcard

Strainer Procedure

A manufacturer of fluid controls, announces the completion and availability of a new strainer catalog and the adoption of a simplified strainer selection procedure. The new 12 page catalog lists self cleaning strainers for steam, air, gas and liquids (including cryogenic services. (Leslie Co.)

For free copy circle No. 16 on postcard

Centrifugal Pumps

A four-page illustrated bulletin on impervious graphite centrifugal pumps is offered. Four basic pump sizes providing capacities up to 140 gpm and heads up to 67 ft are described. A cut-away drawing clearly illustrates the features of a new carton-to-carton rotary seal. (National Carbon Co.)

For free copy circle No. 17 on postcard

STEELMAKING AT JESSOP

Listen...

5...4...3...2...1...0...Lift Off!

The countdown is on.

Scientists and skilled technicians scan their instruments, alert to the least sign of malfunction.

Liquid oxygen has been piped into the fuel chamber of the gleaming Atlas ICBM poised on the launching pad. Other last-minute preparations are completed.

Tension mounts. It won't be long. Listen . . .

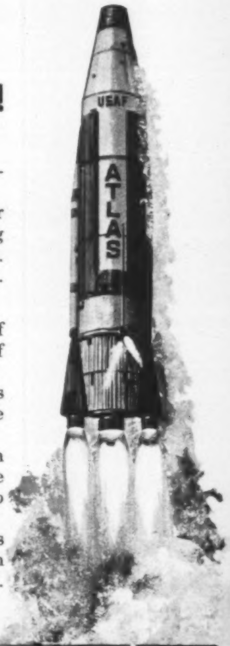
5 . . . 4 . . . 3 . . . 2 . . . 1 . . . 0 . . . *Lift Off!*

The missile comes to life in a swirling cloud of vapor, exhaust and flame. The engine—capable of 360,000 pounds of thrust—roars thunderously.

Airborne now, the Atlas gathers speed and soars majestically on its predetermined course down the Atlantic range—a successful launching.

Jessop Steel Company makes several alloys used in the Atlas—steels forged and machined into precise but rugged mechanisms. And you will find Jessop steel in the launching pad "plumbing" too.

Swepco Tube Corporation of Clifton, N. J., makes piping for LOX systems that fuel the Atlas with liquid oxygen at temperatures of –300° F. to –320° F. *That's* punishment for any metal.



But Swepco's austenitic chromium nickel Rock-Forged pipe can take it. Ductility—to avoid fracture by reason of brittleness—is an all-important factor in this application.

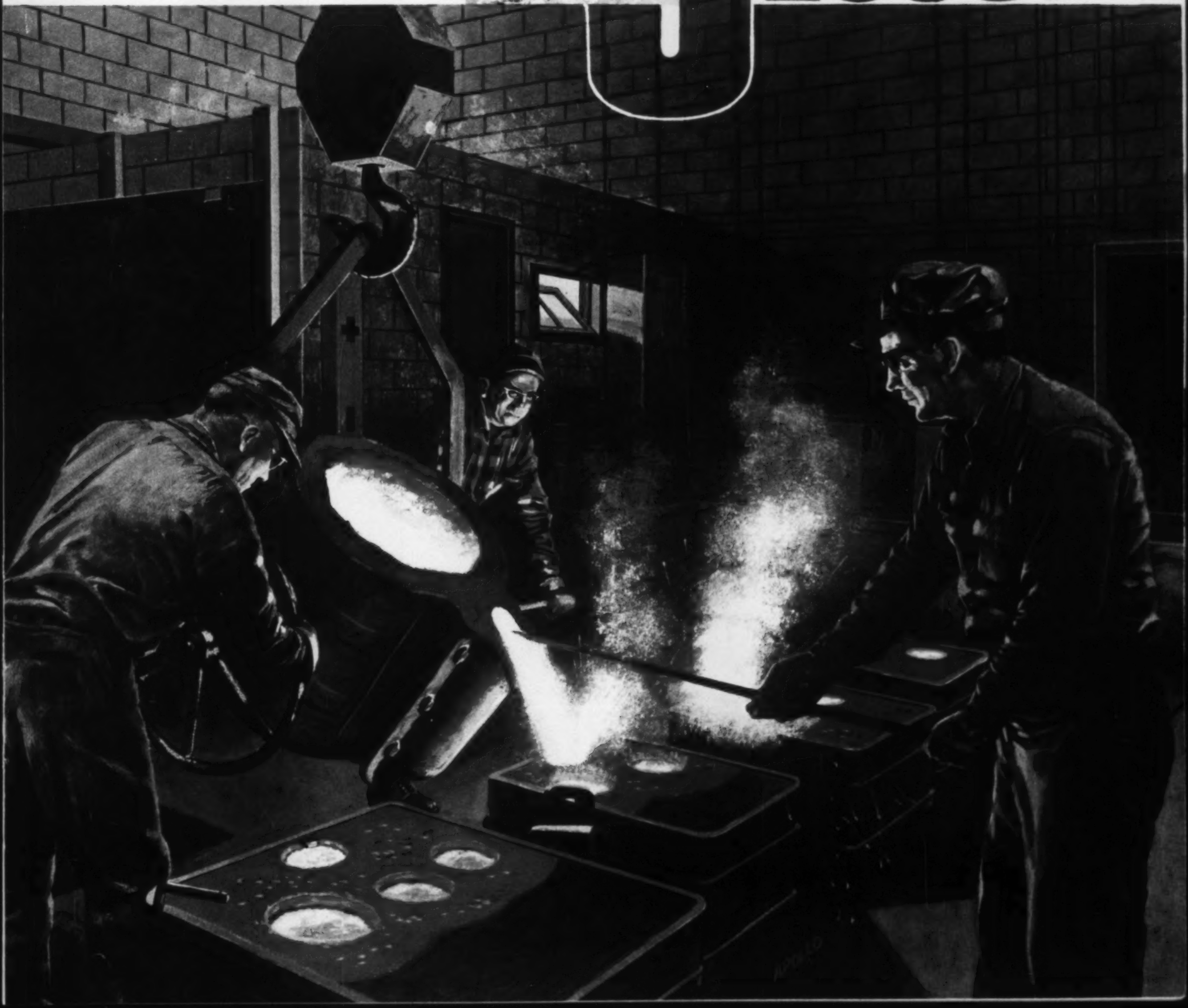
With a value of about 38 foot pounds by Charpy Impact Test, the piping supplied by Swepco handles the job with ease—with an added measure of safety against costly breakdown.

Swepco buys steel from Jessop for rock-forging. Why? Because through controlled chemistry and certain production techniques, Jessop and Swepco developed a steel second to none in workability in the cold forging process.

In making steel like this, experience counts . . . and Jessop has it. Call any of Jessop's 23 sales offices in North America and let us prove it to you.

Plants and Service Centers:
Washington, Pa. • Los Angeles • Chicago • Detroit • Owensboro, Ky. • Wallaceburg, Ont.

JESSOP



Lower Costs – Increase Profits with

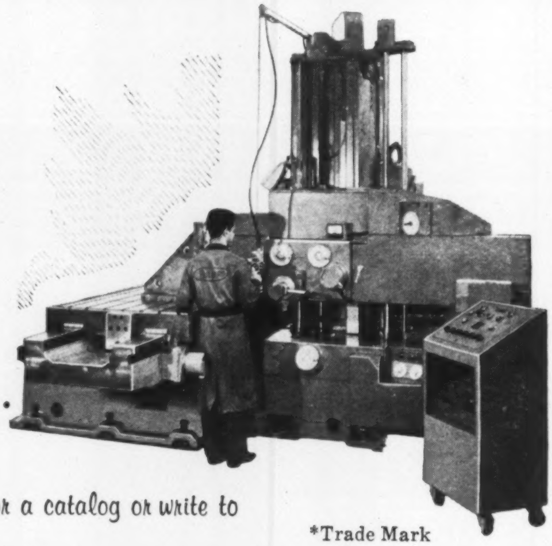
CENTRALIZED POWER CONTROL

..... on the BULLARD DYNAMILL* H.B.M.

Large, easy to read clock-type dials allow the operator to "power" position the head, table, saddle and spindle in relation to the work piece without the use of hand cranks or levers. These dials, when the machine is equipped with numerical control, provide an accurate, instantaneous visual read-out on the positioning of the system.

Simple push buttons on the control pendant direct all motions of the head, table, saddle and spindle. Spindle start and stop, as well as spindle speed changes, are controlled from buttons on the pendant. Four traverse rates and feed engagement are actuated by the operator's forefinger on the pendant trigger.

Thus, within the span of a man's hand, are centralized power controls which allow the operator to keep the tool in the cut more of the time — thereby reducing costs and increasing profits.



For Complete Information,
ask your nearest Bullard Sales Office for a catalog or write to

*Trade Mark

THE BULLARD COMPANY • BRIDGEPORT 9, CONNECTICUT

NEW PATENTS

Stops White Rust

Process for treating metals and products, H. T. Francis and F. H. Roebuck (assigned to National Steel Corp., a corp. of Del.), Dec. 13, 1960. To inhibit the formation of "white rust" on materials having a zinc surface, the material is immersed in an aqueous solution of zinc nitrate and chromic acid at less than 450°F. It's then washed and rinsed. A colorless, corrosion-resistant film forms on the zinc surface. No. 2,964,432-3.

Makes Hot Tops

Machine for making hot tops for ingot moulds, M. G. Tiberg and S. A. Kjellberg (assigned to Aktiebolaget Svenska Kullagerfabriken, Goteborg, Sweden), Nov. 29, 1960. Design for a machine that forms hot tops from a mixture of fine sand and potassium silicate or sodium silicate. No. 2,961,721.

Extends Furnace Life

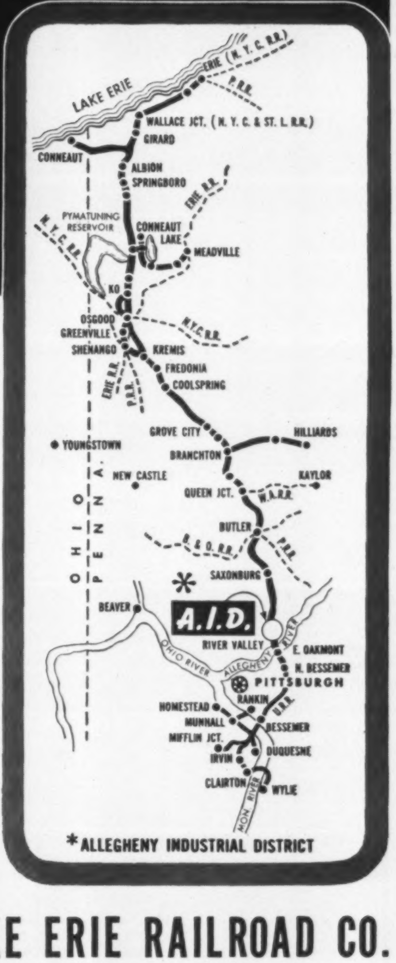
Oxygen lance with bent tip, A. J. Kesterton and A. V. Williams (assigned to Steel Co. of Wales Ltd., Abbey Works, Port Talbot, Wales), Dec. 20, 1960. To inject an oxygen jet into an open hearth furnace, the gun is lowered through an opening in the roof and the oxygen jet is directed at an angle onto the surface of the bath. Splashing is larely eliminated, and refractory life thereby increased. No. 2,965,370.

Controls Handling

Material handling control system, D. W. Fath and C. E. Smith (assigned to Cutler-Hammer, Inc., Milwaukee), Nov. 29, 1960. A control system improves material handling for charging blast furnaces with coke and the like. No. 2,962,172-3 & 2,962,175.

Copies of U. S. Patents are available at 25¢ each from Commissioner of Patents, Washington 25, D. C.

the right time
and the
right place
for
your new
plant site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ERIE (N. Y. C. R.R.)
P.R.R.
WALLACE JCT. (N. Y. C. & ST. L. R.R.)
GIRARD
CONNEAUT
ALBION
SPRINGBORO
ERIE R.R.
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KO
OSGOOD
GREENVILLE
SHENANGO
N.Y.C. R.R.
KREMIS
FREDONIA
COOLSPRING
ERIE R.R.
P.R.R.
GROVE CITY
HILLIARDS
YOUNGSTOWN
BRANCHTON
NEW CASTLE
KAYLOR
QUEEN JCT.
W.A.R.R.
BUTLER
B. & O. R.R.
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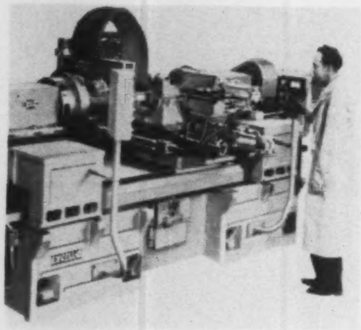
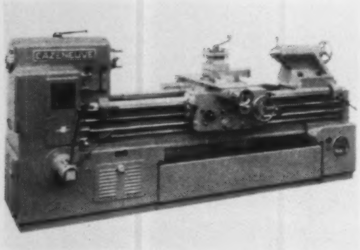


Versatile Setup Shaves Boring Costs

Engineering multiple operations can reduce machining costs. Accommodating some 47 different sizes of heavy-duty pillow blocks, a precision boring machine cuts handling time and the resultant fatigue. Even more important, product accuracy improves because all operations are performed at one setting. Two standard spindles carry a minimum number of interchangeable boring quills. One common-fixture base holds several easily-changed subfixtures. The clamping arrangement is also common. For each run of different parts, you simply readjust the set of clamps. You don't need several machines on individual jobs, one will do. (Ex-Cell-O Corp.)

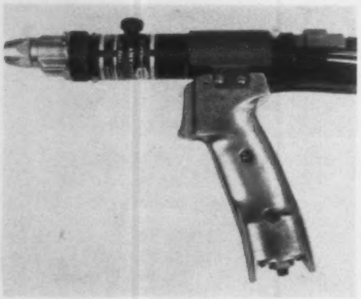
For more data circle No. 35 on postcard, p. 107



Tracer Lathe Boasts 0.0005-In. Accuracy

Powered with a 12-hp motor and a multiple V-belt drive, a precision lathe comes equipped with taper attachment and/or a copying attachment. All shafts mount on antifriction bearings and have 4-way tool turrets—accurate to 0.0005 in. Lead and cross-feed screws are ground for accuracy. All moving parts are automatically pressure lubricated to insure efficiency and low upkeep. The rugged bed features diagonal bridging. (Cazeneuve Lathes, Inc.)

For more data circle No. 36 on postcard, p. 107



Four-In-One Torch Suits All MIG Welding

With the ability to do four types of MIG (Metal-Inert Gas-Shielded) welding, this water-cooled torch operates continuously with up to 500-amp current. It can spray arc, short arc, plug and spot weld. All service lines (gas, power, water and wire) enter through the rear of the barrel. This lets the welder support them on his shoulder for balanced-torch operation. Changing from one wire size to another is routine. Turning a knob changes contact tubes. The trigger is easy to use, even with heavy gloves. (Linde Co.)

For more data circle No. 37 on postcard, p. 107

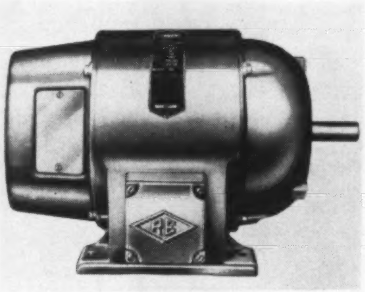
Vacuum Heat-Heat Units Feature Gas Cooling

Featuring gas cooling with a fan for forced circulation, new vacuum heat-treating units improve metallurgical results. The operator sets time and temperature to start the unit through its automatic cycle. After pumping to a preset vacuum, the work is heated. At the end of the soak cycle, an inert gas is introduced into the chamber. A centrifugal fan forces this gas along the finned cold wall, and then up through the work load. The air path is controlled to direct the gas to the work at optimum velocity with little turbulence. When work reaches 300°F. an alarm sounds. This is a signal for the operator to unload the work. (Ipsen Industries, Inc.)

For more data circle No. 38 on postcard, p. 107

Step-Starting Motors

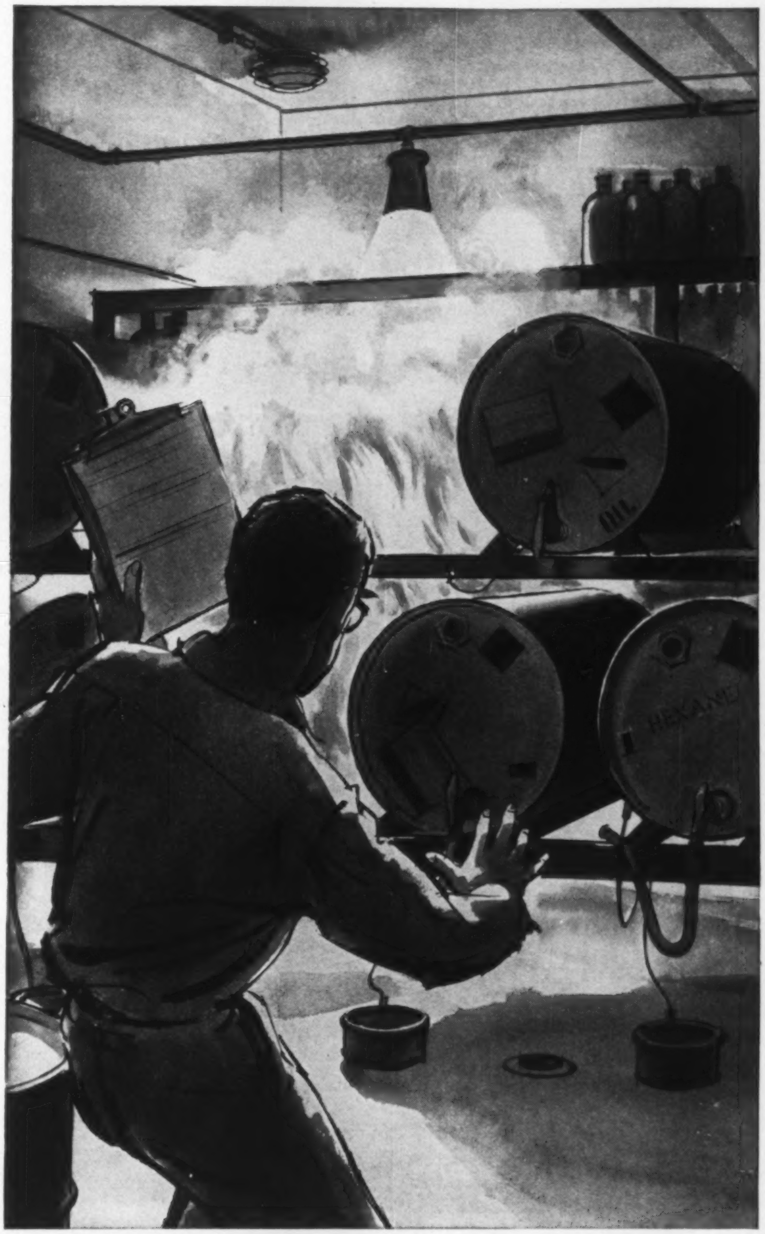
In new frame sizes from as small as 182-326-U, the primary feature of these wound-rotor motors is their "step-method" of starting heavy loads. A slow speed step applies high starting torque. Full operating speed is reached through a series of steps. The motors find uses on cranes, hoists, printing presses, elevators and other machinery where actual operation requires minimum horse-power, yet heavy starting inertias must be overcome. They are made in all standard horsepower ratings from ½ h.p. through 40 h.p. plus the following intermediate horsepower ratings: 2½, 4, 8¾, 12½, 17½, 22½, 27½, 32½, 35 and 37½. Mounting can be horizontal, ceiling or side-wall. (Reuland Electric Co.)



For more data circle No. 39 on postcard, p. 107

Remote Engine Control

New and automatic, a remote controller starts and stops engines according to the power demand. Used with engines powering mobile air conditioners, refrigeration units, pumping systems, and the like, the controller operates when actuated by a float switch, thermostat, time clock, or similar device. When the engine begins to run under its own power, a cranking-control relay disconnects the crank circuit. Should an engine fail to start, a switch trips automatically after ap-



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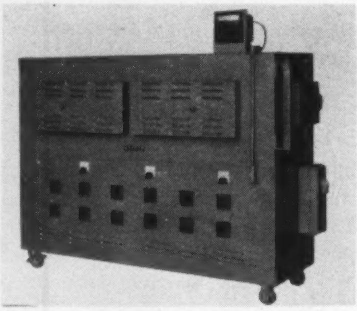
proximately one minute and terminates cranking action until a reset button is pushed. This prevents excessive drain on the battery. The controller may be used with either battery or magneto ignition. (Kohler Co.)

For more data circle No. 40 on postcard, p. 107

Tube Furnaces

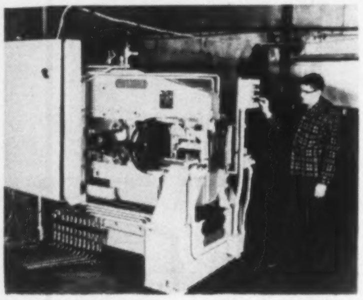
For zone control to 2822 deg F, now available are non-metallic resistor furnaces equipped with tubes made of silicon carbide or alumina, in sizes up to a practical 8-in. diameter and 72-in. length. The silicon carbide tubes themselves serve as the resistor. Doors are provided at both ends for easy tube replacement or change. The furnaces particularly adapts to the firing of bar-stock material and to gradient applications. (Harrop Precision Furnace Co.)



For more data circle No. 41 on postcard, p. 107

High Speed Joint

With a work cycle of less than 25 seconds, an automatic tube-mill strip welder shears, welds and planishes. Its mesh-seam welding technique achieves three major tube-mill objectives: high-speed joining,



A pair of Reversing 2-High Rolling Mills —36" and 18"—

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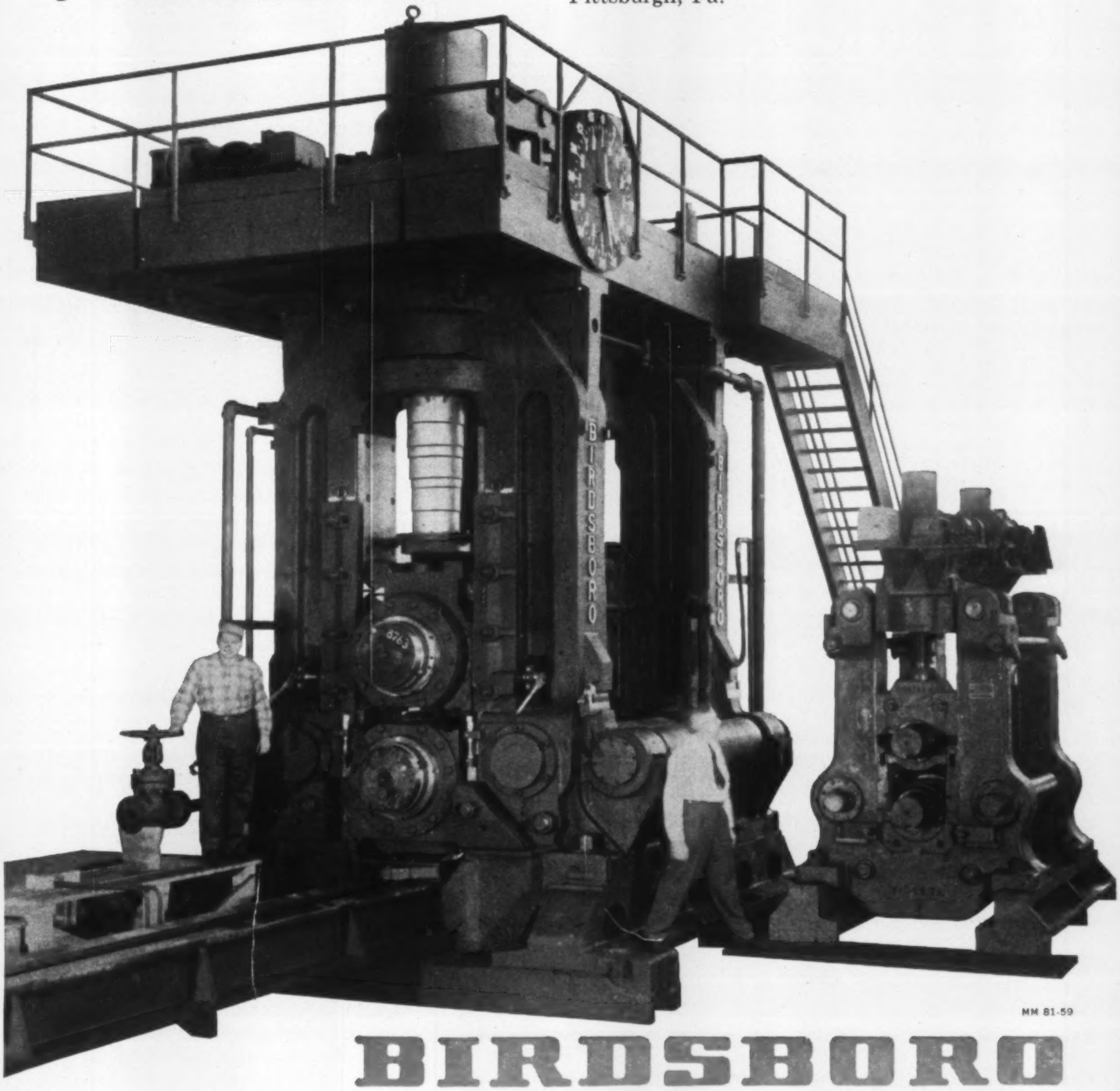
For two different clients, for two different jobs, but they were produced side-by-side . . . each a product of Birdsboro's broad experience . . . experience that covers the many sizes and types of rolling mills and all their variations.

Regardless of variation, one factor remains the same, each mill is the successfully combined effort of the builder and the buyer—the experienced mill designer and the user. Each offers invaluable contributions to the successful operation of the installed unit. Each points the way to profitable productivity. *Sales Department, Engineering Department and Mfg. Plant:* Birdsboro, Pa., *District Office:* Pittsburgh, Pa.



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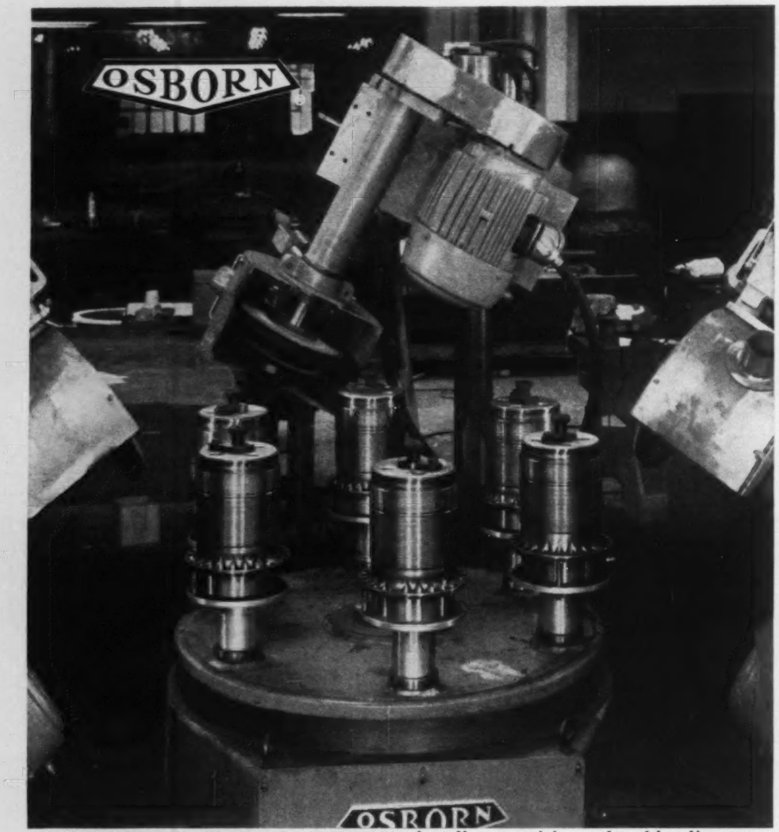

THIS AUTOMATIC FINISHING OPERATION handles precision edge blending on aircraft engine cylinder barrels. Setup consists of an Osborn 6-station index table and three finishing heads equipped with Osborn Fascut® Brushes with deburring compound. Heads No. 1 and 3 each brush one minute clockwise and ccw to put .020″ blend on edges of mounting holes. Head No. 2 brushes 1½ minutes cw and ccw to put .010″ blend on top edge and O.D. thread ends.

EDGE BLENDING cylinders

done 566% faster with OSBORN power brushing

Here's an aircraft manufacturer with a problem: specifications for these reciprocating engine cylinder barrels called for precision tolerances. Hand finishing rate: 3 parts an hour . . . too slow . . . too costly.

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It's another case-in-point of today's Osborn power brushes and brushing methods at work throughout industry solving tough metal finishing problems. An **O**sborn **B**rushing **A**nalysis—made in your plant now at no obligation—can cut costs on *your* deburring, cleaning, polishing and precision blending operations. Write or call *The Osborn Manufacturing Company, Dept. F-107, Cleveland 14, Ohio. Phone ENdicott 1-1900.*

OSBORN

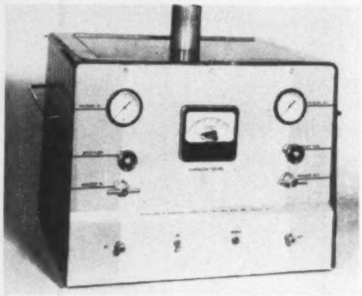
Metal Finishing Machines . . . and Finishing Methods
Power, Paint and Maintenance Brushes • Foundry Production Machinery

high-quality weld, and high reliability. Weld quality equals parent metal strength, company engineers report. This permits the seam to remain in the work in most cases. The machine welds cold-rolled steel stock ranging from 0.40-0.060 in. thick and from 2-7 in. wide. A 10 hp hydraulic unit delivers 15,000 lb of force to the planishing rolls and is a power source for strip clamping and shearing. (National Electric Welding Machines Co.)

For more data circle No. 42 on postcard, p. 107

Hydrogen Purifiers

A complete line of economical, easy-to-operate purifiers produces

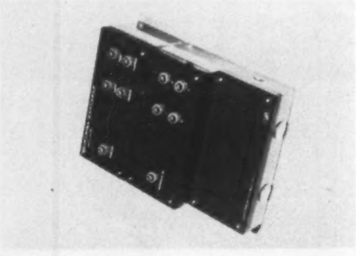


ultra-pure hydrogen from an impure hydrogen source. With this equipment, laboratories and industrial plants can now purify hydrogen in milliliters per minute or cubic feet per hour quantities. (Milton Roy Co.)

For more data circle No. 43 on postcard, p. 107

Cuts Die Damage

Molding die damage is a threat of the past, thanks to a mite-sized electronic device that automatically

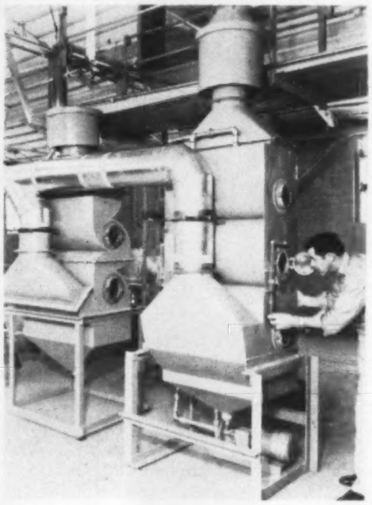


prevents the application of clamping pressure and stops molding machines when they are closing improperly. The malfunction detector consists of a visual control panel, a pressure sensor which is fastened to the die cylinder and position sensors which are mounted on the mold itself. (Wintriss Controls, Div., Industrionics Controls Inc.)

For more data circle No. 44 on postcard, p. 107

Controls Odors

A variable-orifice wet scrubber with air volume control, develops high scrubbing efficiencies on a wide range of fumes, dust and odor problems, despite wide variation of air or gas flow. The unit is not limited by either high-moisture or temperature conditions of the effluent gas. Some of the specific industries where the unit will prove useful include: cement, limestone, metal production, chemical, food processing, pharmaceutical, ceramics, paint and paper products. (Johnson-March Corp.)

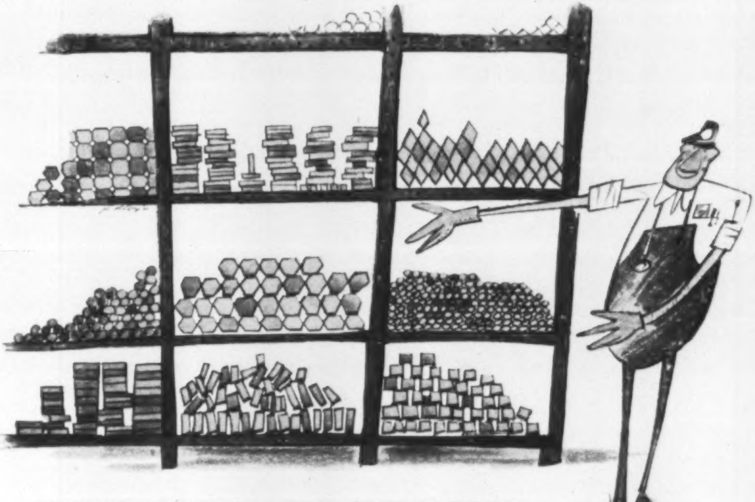


For more data circle No. 45 on postcard, p. 107

Shell-Core Blower

A new, semi-automatic, shell-core blower boasts many features including power roll-over. Only a few manual operations such as core box opening and closing are required in a cycle. Each step in sequence is automatically controlled by pre-set timers to insure consistent quality of shell core production. This compact unit has all the basic features and versatility of its fully automatic counterpart. Occupying an area only 8 x 8 ft, the machine is made for either gas or

BEANS FULL OF KNOWLEDGE...



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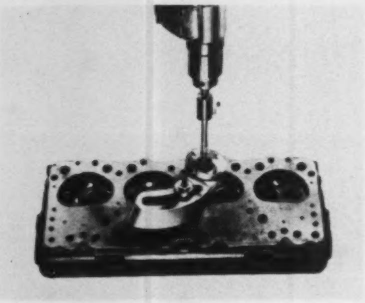
electric core box heating, and accommodates core boxes up to 27 x 20 in. with a maximum depth of 15 in. The integral sand hopper will hold 150 lb of sand. (Shalco Div., The National Acme Co.)

For more data circle No. 46 on postcard, p. 107

Services Worn Valves

Just released is a precision tool specifically designed to service worn valve guides. The high-speed tool reams valve guides oversize to the engine manufacturers' original specifications, and core-drills integral valve guides for replaceable valve-guide bushings. Self-alignment to the valve guide, through a combination valve seat and valve-guide adapter, assures direct-center fit. It can be used readily with either a drill press or a hand drill. The unit services valve guides for all automotive, truck, bus, tractor, construction, marine and stationary engines with low tool cost. (Hall-Toledo, Inc.)



For more data circle No. 47 on postcard, p. 107

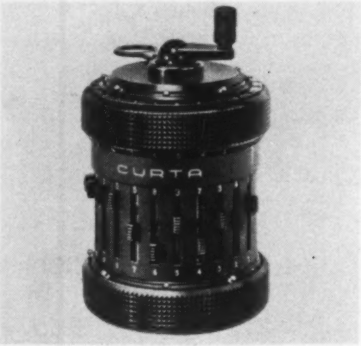
Portable Shears

Now available are compact, portable pneumatic shears. This tool weighs only 2½ lb and cuts at 6 fpm with a capacity of 0.080 in. in steel. Minimum cutting radius is 1½ in. The cutting blades are easily replaced. They are also made of stellite for cutting stainless steel. The shears are powered by a compact, air-rotor motor through planetary gearing. They are designed for intricate work. (Newage Industries, Inc.)

For more data circle No. 48 on postcard, p. 107

Compact Calculator

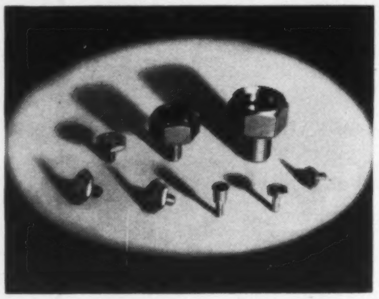
For designers, engineers and technicians, a new, lightweight calculating machine gives precise "on-the-spot" answers for every type of mathematical operation. Combining accuracy, speed and versatility plus portability, it has 11 digits on the keyboard, 8 digits on the indicator dial and 15 digits in the answer dial. It is about the size of a fishing reel and weighs 12 oz. Easily held and operated in one hand, the unit is noiseless, rust and corrosion-proof and does not require an external power supply. (Curta Co.)

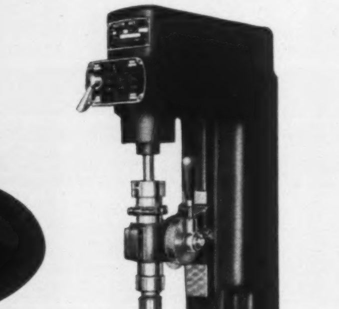


For more data circle No. 49 on postcard, p. 107

Better Bases

Improved semiconductor mounts are made by a new production technique from two copper alloys that are also new to the job. The bases double as heat-sinks and electrically conducting mounts. They are cold-formed from either oxygen-free copper or from a zirconium copper alloy. The former material has high thermal and electrical con-





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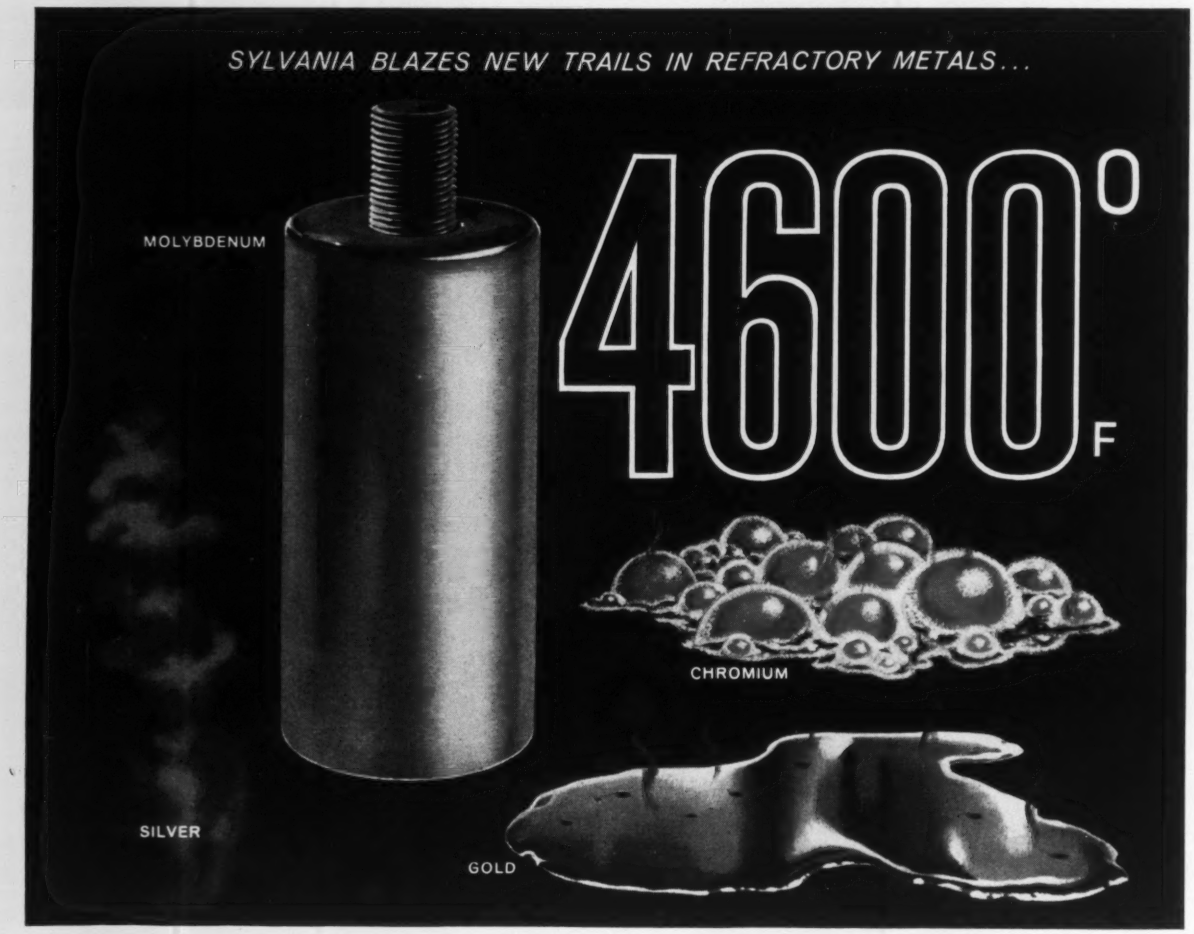

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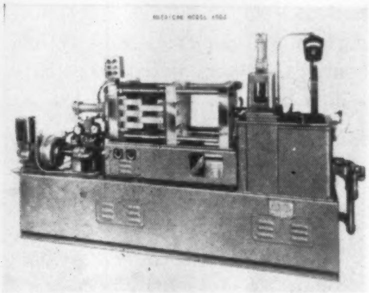
For more data circle No. 50 on postcard, p. 107

Die Casting Machine

Two new developments in a 150-ton locking-pressure die-casting machine double the previous possible output of die castings. A new, hydraulic, combination pump is responsible for the increased output. It delivers 21.8 gallons per minute. The unit completes 1300 free cycles per hour; a complete cycle in 2.8 seconds. It has valving which allows pressure regulations between the clamping cylinder and the shot cylinder to be isolated from each other. Re-design of the safety-shot die interlock means greater safety for the operator from molten metal dangers. (American Die Casting Machinery Co.)



For more data circle No. 51 on postcard, p. 107

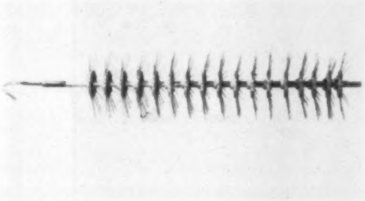
Pulse Calibrator

Portable, pressure-pulse calibrators make possible calibration of complete, dynamic-pressure recording systems. The instrument applies pressure pulses of precisely-known values to the active face of pressure transducers. The calibrator provides 3-millisecond rise time from atmospheric pressure to the calibration pressure that can be set from a few inches of water to 1000 psi. The calibrating pressure is accurately indicated on the precision Bourdon tube gage supplied with the unit. A 1600-psi supply flask, contained in the calibrator, feeds gas, as needed, for refilling the calibration pressure flask. (Atlantic Research Corp.)

For more data circle No. 52 on postcard, p. 107

Anodizing Rack

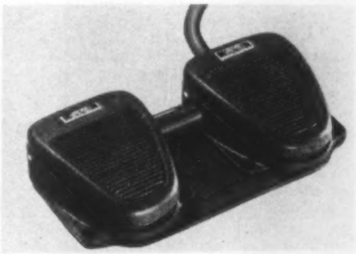
"In-use" tests on newly-designed racks promise "an end to anodizing headaches." The rack's splines are aluminum cored for better electrical conductivity and titanium clad to virtually eliminate corrosion. These racks are highly versatile, featuring an infinite variety of adapters, pin strips, discs and other specially-designed accessories. (Continental Rack Co.)



For more data circle No. 53 on postcard, p. 107

Dual Controls

For positive control of "up-down," "slow-fast," and other reversible operations, a new switch requires only light foot pressure. Mounted on a common steel base plate, it provides a momentary contact (press to start, release to stop) for SPDT circuits rated to 20 amp, 125-250 v ac, and one horsepower, 115-230 v ac. Only one external power cable is needed. A tube between treadles conceals internal wiring. A skid-proof base prevents sliding, while four mounting holes allow rigid attachment to floor or equipment, if desired. Overall size of the unit is 8⅜-in. wide, 4½-in. deep and 1½-in. high at the treadle operating end. Total weight, without cordset, is 4 lb, 13 oz. (Linemaster Switch Corp.)



For more data circle No. 54 on postcard, p. 107

Safety-Glass Frames

Safety frames, with soft vinyl side shields, fold flat against the frame for convenient storage in pocket or carrying case. The soft side shields conform to facial contours, the temples telescope in and

ADVANCE PNEUMATIC
EYE-BATH BOTTLE

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ALWAYS IMMEDIATELY ACCESSIBLE FOR FLUSHING DANGEROUS SUBSTANCES FROM THE EYE

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BASIC METALWORKING DATA—Includes those metalworking plants with 20 or more production workers in the 185 metalworking industries. Data are summarized nationally by state, and by industrial area. The number of plants are listed by two, three, and four-digit SIC codes. There is also complete, accurate information on secondary producers in each four-digit SIC group by industrial area. Plants are further qualified as to 36 different types of metalworking operations, e. g., milling, welding, etc.

BASIC MARKETING MAP OF METALWORKING—A six-color map, 23 x 35 inches, showing metalworking as spread across the entire United States. The map emphasizes the concentration in the 27 states with 128 industrial areas accounting for over 94% of metalworking's plants employment in 1960.

MASTER LIST OF PLANTS IN METALWORKING—The Master List comes in two forms. Volume I is a listing of plants aphabetically by states. It also includes local, city and state address, primary and secondary SIC codes, actual production employment data and area and county codes. Volume II lists plants by primary SIC codes, alphabetically by states. This volume also includes the individual plant data indicated in Volume I.

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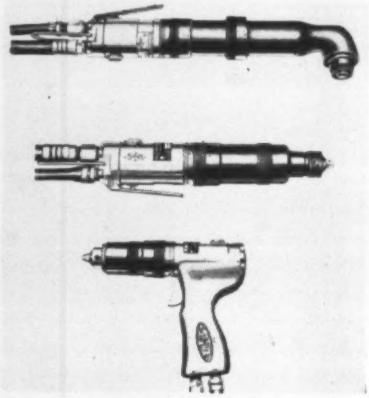
out and a universal nosebridge assures proper fit and protection for every worker. Total weight is less than two ounces. (Watchemoket Optical Co.)

For more data circle No. 55 on postcard, p. 107

Assembly Tools

With interchangeable handles, motors, gear cases (rpm), and clutches a new line of air-powered drills, screwdrivers, and nut runners assures a tool that exactly fits the job. Any one of the sub-assemblies quickly changes to convert the tool to a different need. Rotating parts mount on extra-capacity ball bearings. Rotors and spindles have a high finish for power and low air consumption. Gears and pinions are over-size and correctly hardened for quietness and long life. No special tools or techniques are needed for servicing. Air and oil exhaust from the base of the handle through a remote exhaust hose. Motors have a built-in speed control and a built-in oil reservoir. When a line oiler is not used, the reservoir will hold and automatically dispense enough oil for one day's operation. (Albertson & Co.)



For more data circle No. 56 on postcard, p. 107

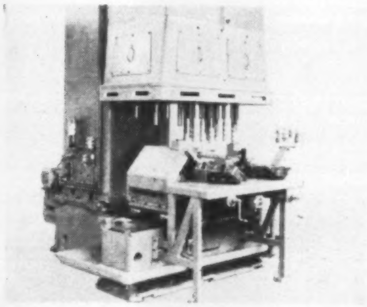
Rust Preventative

Excellent cleaning properties are produced by a new alkaline rust preventative cleaner. It will not stain machined parts and is extremely easy to control. Shops use alkaline power-washer equipment to clean oils and dirt from parts which require storage prior to assembly or further machining operations. (Kerns United Corp.)

For more data circle No. 57 on postcard, p. 107

Drills Engine Head

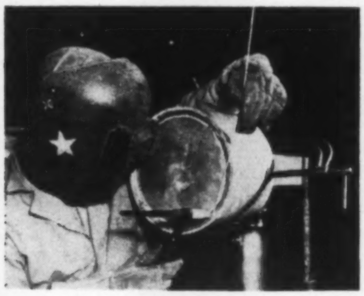
One of twelve machines that form a new segmented production line for processing cast iron, V-8 or six cylinder truck engine heads, a 4-station, shuttle-type, slip-spindle drilling machine performs combined operations. Features of the new machine are typical of other reaming, tapping, spot-facing, milling, chamfering and boring units in the line. The basic design handles present production requirements of about 25 parts per hour and it provides for quick retooling due to product design changes. (F. Jos. Lamb Co.)



For more data circle No. 58 on postcard, p. 107

TIG Weld Holder

An air-cooled TIG (tungsten-inert-gas) weld holder boasts 160-amp ac or dc continuous capacity. It provides rapid, clean and smooth welding of thin gauge aluminum, alloy and stainless steels, brass, copper, magnesium, molybdenum, nickel, silver and other metals. It's easy to handle in confined spaces. Air-cooled construction eliminates



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The "BIG K"

Now, after more than four years' research, Kalamazoo brings to you the all new Model 14A — horizontal metal cutting bandsaw. Incorporating some 30 shop proven, cost saving features, this hydraulic driven, heavy duty bandsaw offers cutting capacity and ability in excess of *any* cut-off method, at far less tool cost per square inch of cutting.

Most important among these profit producing features are: positive control force feed; clockwise blade rotation to reduce teeth shock — increase blade life; convenient 36" machine height to reduce operator fatigue; large 14" x 24" capacity; push button control; dual movable vise jaws; adjustable blade tension.

For complete details on this amazing new machine tool, phone, write or wire your Kalamazoo representative. Facilities for test runs of your material on the "Big K" are at your disposal — at no obligation.

MACHINE TOOL DIVISION
Kalamazoo Tank & Silo Company

508 Harrison St.
Kalamazoo, Mich.

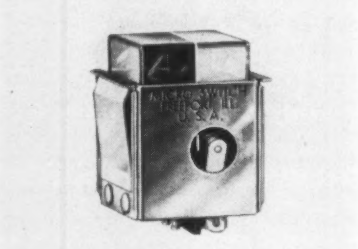
the need for a water system. (Air Reduction Co., Inc.)
For more data circle No. 59 on postcard, p. 107

Damping Tape

Designed for easy application on thin sheet metal, pressure-sensitive tape reduces resonant vibration and accompanying noise by converting vibration energy into heat. It consists of foam, plastic and high-tack adhesive. The tape conforms to rough and irregular surfaces. Just finger pressure, against its plastic backing, applies the tape rapidly. No application tools are required. Already used on such aircraft as jets, prop driven transports, airliners, and even helicopters, it dampens vibrations originating from both air-borne and structure-borne energy. Other potential uses include damping vibrations of metal cabinets, doors, sinks, desks, automobiles, washers, dryers, freezers typewriters and television sets. (Minnesota Mining & Mfg. Co.)
For more data circle No. 60 on postcard, p. 107

Tiny Pushbutton Switch

Smaller than a 1-inch cube, a tiny pushbutton switch measures only 0.812 x 0.890 x 1.303 in. It offers single or two-color indication. Each half of a divided display screen has its own individual light source. With five colors available for the display screens, a single switch has any one of 15 color combinations.



Bright lamps under each half of the display screen light up the switch even under high ambient light levels. It is designed for control equipment, computers, industrial and commercial applications where visual control indication is required. You can replace the miniature lamps in seconds. (Minneapolis-Honeywell Regulator Co.)
For more data circle No. 61 on postcard, p. 107

Radiographic Advances

A new, x-ray image amplifying technique increases by five times the previous limits of effective fluoroscopic magnification and yields a clearer picture. The discovery means that the growing field of nondestructive industrial testing by x-ray will be materially improved and expanded to include smaller products. For example, tiny internal assemblies with minute vacuum tubes and wires as small as 1/500-

RA 330® brings the space age CLOSER

RA 330 supports rocket cases in pit furnace 10 ft. diameter by 30 ft. deep.

RA 330 provides strength at 1900° F. to support, without fear of dropping, a 3500 pound load; resistance to thermal shock of rapid heating and air quenching; resistance to furnace atmosphere and oxidation.

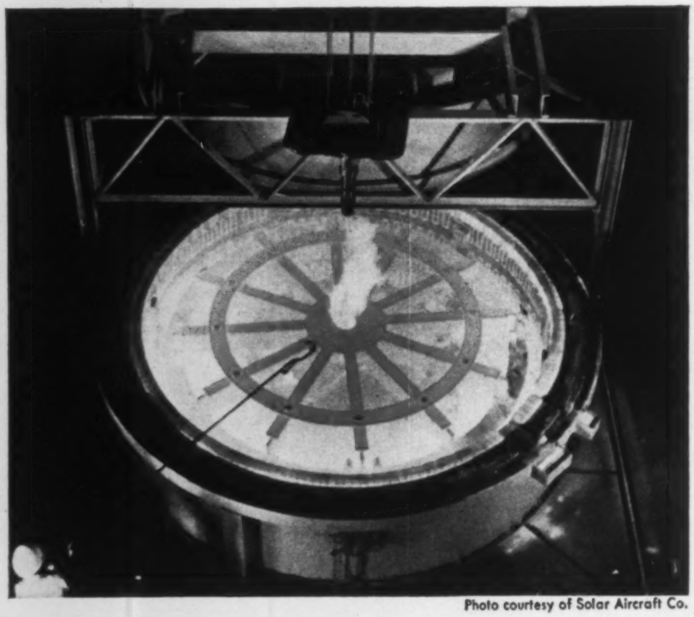


Photo courtesy of Solar Aircraft Co.

Based upon highly successful use of RA 330 in other applications with temperatures ranging up to 2250° F., Solar Aircraft Company selected RA 330 for this critical application.

For best performance specify RA 330 for your heat treating fixtures and furnace parts.

Rolled Alloys Heat Resisting Alloy Specialists will gladly be of service. For technical data—send for Bulletin No. 107.

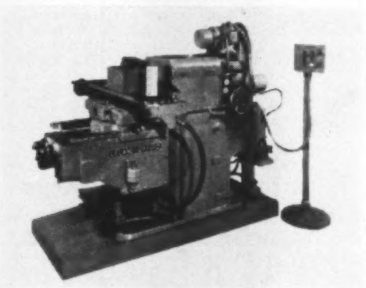
ROLLED ALLOYS, INC.
Heat and Corrosion Resistant Alloy Specialists
5309 Concord Avenue • Detroit 11, Michigan
330 William Street • South River, New Jersey

in. wide now can be examined without opening or disturbing them. (Picker X-Ray Corp.)

For more data circle No. 62 on postcard, p. 107

Gun Drill

Designed for drilling deep precision holes in ferrous or non-ferrous materials with carbide-tipped drills, this new, knee-type gun drill is made with either self-contained hydraulic feed or lead-screw feed gun drilling unit. A knee-type setup eliminates expensive fixturing when a variety of work is gun drilled by coordinate elevating, traversing and swiveling of the table. The unit drills accurate holes up to ⅝ in. diam by 7 in. deep. (Leland-Gifford Co.)



For more data circle No. 63 on postcard, p. 107

Power Vacuum Sweeper

For indoor or outdoor use, a sweeper with a large filter bag and 30-36 in. sweeping width cleans up to 30,000 sq ft per hr. Its full vacuum action eliminates belts, gears, brushes and chains and reduces periodic maintenance to normal engine care. Picking up forward or backward, the sweeper cleans up industrial plants, warehouses, outside facilities and the like. It has a 3 hp, 4-cycle gasoline engine. (Elgee. Mfg. Co.)

For more data circle No. 64 on postcard, p. 107

Furnace Alloy

In a brazing furnace for the thrust chambers of rocket engines, a new-alloy hearth-grid assembly operates at a temperature of 2300°F. The grid supports engine parts during a brazing cycle of from five to eight hours. The patented alloy is composed of 26 pct chromium and 35 pct nickel. It is strengthened and stabilized with cobalt and tungsten. (American Brake Shoe Co.)

For more data circle No. 65 on postcard, p. 107

Load-Indicating Pliers

An industrial plier permits the time-after-time application of a predetermined clamping force—regardless of the thickness of the work held. This new, metal-holding tool

HOBART
Applications
Submerged arc welding
CO₂ Gas Shielded
Inert Gas Shielded
Tubular and Fabricated Wire
HOBART

"For the ultimate flexibility in automatic welding, don't 'marry' one particular process.

Consider the future. Select equipment that keeps ahead of obsolescence. Today you may weld mild steel. Next year it may be high strength steel, or perhaps aluminum. Five years from now...who knows? With new welding advances being made every day, you must stay ahead of the field."

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...use automatic welding equipment that's convertible and can be easily adapted to the newer metal working materials and processes.

Ask for Illustrated Bulletin covering latest automatic welding process.

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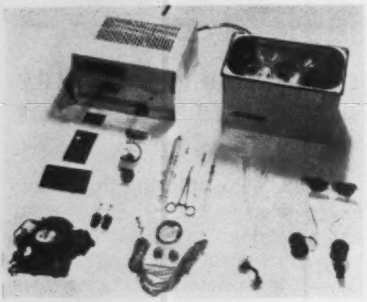
Manufacturers of the world's most complete line of arc welding equipment

is used where it is vitally important to re-apply the same holding force to parts of varied dimensions. (Lapeer Mfg. Co.)

For more data circle No. 66 on postcard, p. 107

Ultrasonic Cleaner

Featuring a broad-band modulated circuit, which eliminates the need for automatic tuning, an ultrasonic cleaner rates at 120 w average power, 480 w peak power. Operation is simple; the generator plugs into any 117-v, 50-60 cycle source and consumes no more current than a light bulb. Cleaning begins as soon as the tank is filled with a suitable cleaning solution. A transducer converts electrical energy from the generator into sound waves. When this ultrasonic energy enters the cleaning solution, the fluid explodes into millions of submicroscopic vacuum bubbles. This bubble bombardment disintegrates soils. Complete cleaning of all types of soils is achieved in seconds. Intricate parts can be cleaned without disassembly. (Ultrasonic Industries)



For more data circle No. 67 on postcard, p. 107

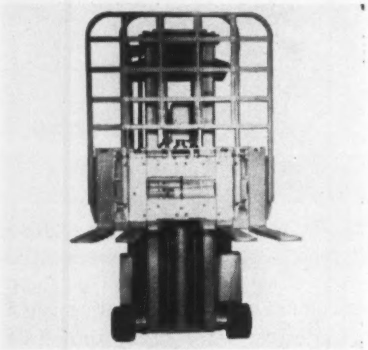
Heat Exchanger

A compact, block heat exchanger made of Karbate impervious graphite provides true counterflow. Fluid flow on both sides of the new exchanger contacts impervious graphite only. The units can therefore be used for heat transfer between corrosive liquids and gases, as well as for the more conventional heating or cooling of corrosive solutions with steam or water. (National Carbon Co., Div. of Union Carbide Corp.)

For more data circle No. 68 on postcard, p. 107

Handling Unit

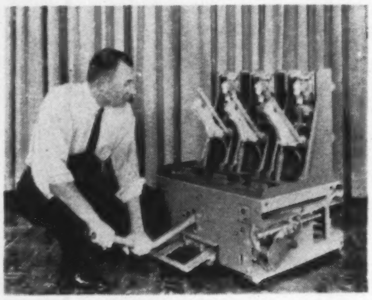
For operations calling for exact positioning of loads, a new materials-handling unit offers a side shifter mounted on a 24 v truck. The side shifter enables the operator to shift loads 4 in. to either side of center without moving the truck. This saves hours of maneuvering time. The attachment also makes it possible to place or pick up loads against walls, perform close loading in box cars, trucks and other places that require handling loads in an exact location. (Lewis-Shepard Products, Inc.)

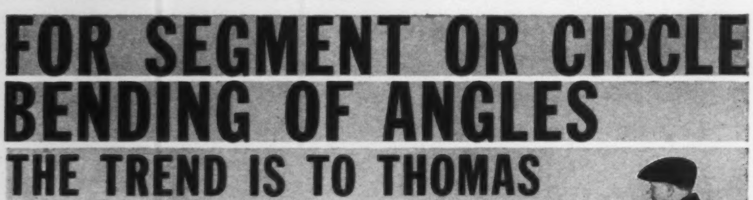


For more data circle No. 69 on postcard, p. 107

Circuit Breaker

New 13.8-kv equipment incorporates completely new design from ground up, specifically for stored-energy closing. The switch gear affords closed-door drawout and indication of breaker's position in compartment, face-found blowout





FOR SEGMENT OR CIRCLE BENDING OF ANGLES

THE TREND IS TO THOMAS

Thomas Angle Rolls will handle angles up to 6 x 6 x 7/8"

Thomas Angle Benders are of all steel construction and come in two styles and four sizes. Standard rolls permit "leg in" and "leg out" bending of angles. The machines may be converted for bending flats, rounds, squares, beams, channels, pipe and other shapes.

THOMAS

MACHINE MANUFACTURING CO.

PITTSBURGH 23, PA.

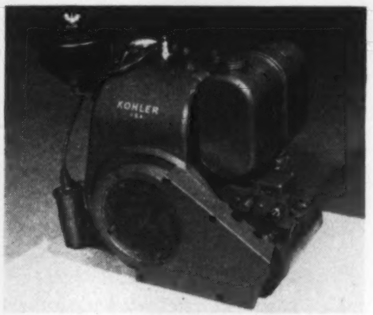
Write for Bulletin 314-A

65

coils, virtual elimination of need for adjustments, ease of maintenance, faster closing of contacts and fast fault interruptions, smaller size and floor area, low center of gravity and added space and accessibility to compartment front for all secondary circuits. (I-T-E Circuit Breaker Co.)
For more data circle No. 70 on postcard, p. 107

Air-Cooled Engine

Developed for engine-driven equipment in the industrial, construction, agricultural, and garden fields, a 9.5 hp engine powered mechanized snow sleds on a 1200-mile trip through the Alaskan wilds. Compact, lightweight, and rugged, the engine is a single-cylinder, four-cycle model of cast iron construction and large-bore, short-stroke design. Features include electric starting, anti-friction ball bearings on the crankshaft, spark advance mechanism, oil bath air cleaner, fuel pump, and adjustable flyweight governor. (Kohler Co.)
For more data circle No. 71 on postcard, p. 107



Porous Alumina

Porous alumina has been developed for use in high-temperature, high-power arc applications. Experiments have proved that porous alumina may be used with great success in circuit breakers, lightning arresters, arc diffusion systems, and other insulation applications. The material resists the temperature of a high-powered arc. It also helps dissipate the energy of the arc through outgassing and by providing a rough, porous surface which permits the plasma of the arc to seek out each individual cavity or depression. The air within

$4 a ton premium for chips
$4 a ton oil recovery
The American Model 3800
AMERICAN PULVERIZER CO.

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American Rolling Ring Metal Turnings Crushers quickly pay for themselves. Savings of approximately $4.00 per ton through extra cutting-oil recovery from crushed turnings often pay for the crusher in a short time. In addition, uniform chips command a higher price (up to $4 more per ton). Add to this the valuable savings in storage space (up to 75% less), the easier handling, the heavier car loadings possible, and you have tremendous profit advantages with the American Crusher working in your plant.

If your turnings amount to 20 tons or more a month, there's an American Crusher designed to pay off big for you.

American has manufactured Turnings Crushers since 1917 and makes a wide range of models with capacities from 1 ton to 50 tph.

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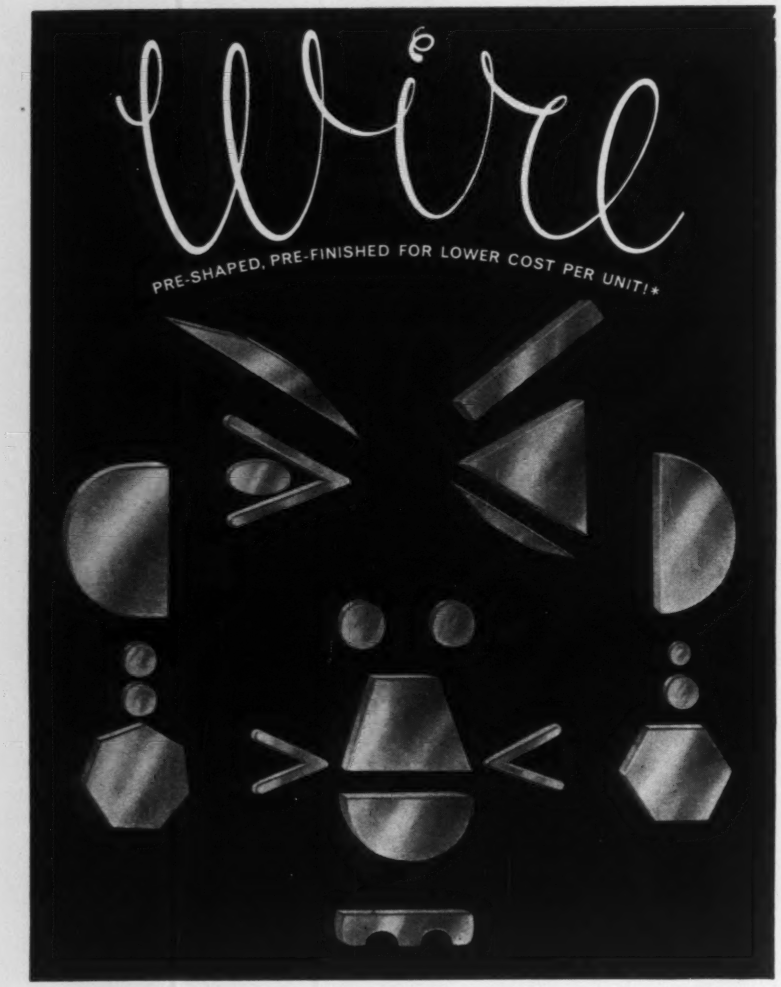
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*Examples shown are greatly enlarged cross-sectional views of selected standard and special shapes available

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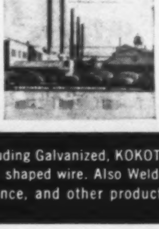
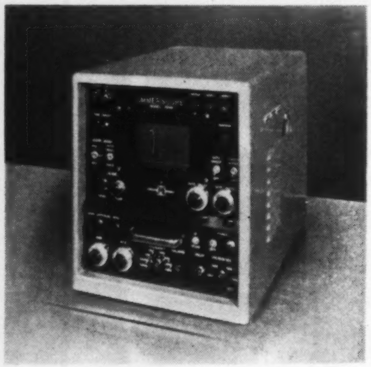


the pores of the material structure expands from the heat of the arc and tends to quench the arc. (Electronic Mechanics, Inc.)

For more data circle No. 72 on postcard, p. 107

Ultrasonic Testing

A new instrument represents over five years of continuous research, development, production and field use for ultrasonic nondestructive testing. The model has features that increase its flexibility and range of usefulness, and other refinements to make its operation easier and more convenient. It is used for the testing of plates, ingots, pipe, tubing, forgings, castings, welds and other bonds, rolled shapes, honeycomb, extrusions, etc. Inspection is not limited to metal objects; other reasonably elastic materials such as glass, hard rubber and ceramics can also be inspected. (Curtiss-Wright Corp.)



For more data circle No. 73 on postcard, p. 107

Zone Refining

A dual-purpose fixture for crystal pulling and floating-zone applications can be added to a high-frequency, induction-heating generator. In the crystal pulling method, single crystals of various materials, especially germanium, have been successfully grown. In this method a seed of known crystal orientation is brought into contact with the surface of the molten metal and slowly withdrawn, producing progressive crystallization. (Lepol High Frequency Laboratories Inc.)

For more data circle No. 74 on postcard, p. 107

Steel Orders Get Off Bottom

A moderate upturn has finally materialized. Business is still spotty and some mills don't see a sustained improvement yet.

But new orders are coming in. Big factors are seasonal, plus end of inventory control.

■ A gradual pickup in steel business is under way. But, overall, the picture remains spotty and advance bookings are not strong enough to make a sustained trend certain.

Here are some of the signs that indicate the upward pull:

Ingot tonnage in recent weeks has been the highest since June. The operating rate has moved up to at least 55 pct on old capacity basis.

Orders for one mill have been coming in at an improved rate for the past five weeks. March bookings for another large mill are better than for any month since August.

Broad-Based — The improvement, small as it is, is broad-based. Except for tinplate, it is not due to a sharp change in any one product or market. Because of the wide range of buyers coming into the market, the improvement is probably based more on seasonal factors and inventory replacement.

The big question hinges on the automotive market. There is little hope of a major recovery without stronger support from Detroit. Unfortunately, that support does not seem to be coming.

Worst Over—Overall, the conclusion is that a real recovery in steel production will depend on the rate of the recovery of the general economy. But as far as steel is concerned, the worst is over.

It should be pointed out that the recent improvement has not helped all mills to the same extent. One large mill with heavier emphasis on lighter steels and dependence on the automotive market says its own order picture does not reflect anything that could be called a recovery.

Mill Buildup—Also noted: Some of the bulge in recent production gains has been caused by mill inventory buildup. Some mills, particularly one major Chicago area mill, have been building up semifinished stocks in advance of equipment repair or replacement.

Also contributing to some reservations about the extent of improvement is the status of automotive orders. Among individual plants and divisions, further cutbacks and setbacks are in the wind. One major user of bars is in the process of cutting back April orders. Inventory will be cut from 30 to 21 days.

Buildout in Sight — This same user will stop buying steel for 1961 models in June and delivery will end in late July for model changeovers. It should be pointed out that this plant, not a stamping operation, is serving one of the strongest of the automakers.

One steel mill reports its February sales to automakers will be lower than January, with March showing little improvement. For some reason, bar orders from auto sources appear to be coming in better than flat-rolled.

Some steel warehouses also are feeling the effects of the pickup and are stepping up their own orders from the mills. But, by and large, the warehouses are keeping their own stocks at a low level where they can. No great upsurge in activity has been noted at the warehouses.

District Steel Production Indexes 1957-59=100

	Last Week	Two Weeks Ago	Month Ago	Year Ago
North East Coast	84	84	81	136
Buffalo	72	74	71	146
Pittsburgh	75	75	69	144
Youngstown	79	83	80	153
Cleveland	72	77	75	172
Detroit	89	91	93	148
Chicago	93	91	86	147
Cincinnati	90	92	86	144
St. Louis	107	105	86	131
Southern	90	88	78	129
Western	101	99	93	139
U. S. Index	84.9	84.9	80.1	144.4

Source: American Iron & Steel Institute

Steel Production, Composite Prices

Production	Last Week	Two Weeks Ago	To Date 1961	To Date 1960
(Net tons, 000 Omitted)	1,582	1,582	11,988	21,620
Ingot Index				
(1957-59=100)	84.9	84.9	80.4	145.1
Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel, base (cents per lb)	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.44	$66.44	$66.44	$66.41
Scrap No. 1 hvy (Gross ton)	$34.50	$33.50	$31.83	$34.50
No. 2 bundles	$24.83	$23.83	$22.50	$21.83

Gear Interest Is Still Strong

The increased rate of inquiries for industrial gears continues.

However, producers say it will probably be April or later before this interest is noticed in production or deliveries.

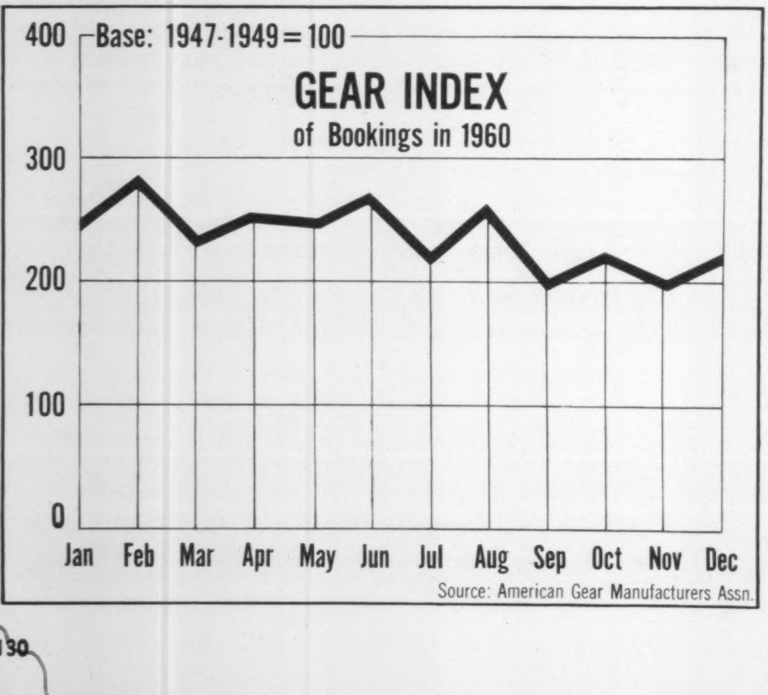
- An inquiry gain in gear demand is holding up in its second week. Gear makers report that the number of requests for quotation, particularly on heavy gears, began to advance about the beginning of February. As the month progressed, the inquiry step-up has held and is showing further signs of strength.

For gear buyers, this doesn't indicate that gear delivery times will begin to stretch out. Most gear producers believe that it will be at least April, and perhaps later, before the wave of requests for selling information is actually translated into an appreciable gain in gearmaking activity.

Sales Rate Unchanged—For one thing, though inquiries are up, the actual rate of new sales has shown little change. The gear industry did surprisingly well in 1960. But the gains were made in only four months of the year. In the other eight, 1960 business levels trailed the 1959 figure.

This suggests that there is still plenty of manufacturing space available, and that even increased production will not stretch gear deliveries appreciably.

One angle that should be watched is price. Gear prices are still soft. It's been suggested that at least a part of the rash of inquiries on prices for new gear orders is nothing more than buyers shopping to get their requirements at the lowest possible price.



Source: American Gear Manufacturers Assn.

New Business—But there is, very definitely, some new business being offered by customers who really need gears. With this gain in demand shaping up, it's very likely that gear prices will begin to firm over the next two or three months.

The buyer who is in a low gear inventory position, and who needs quantities of stock gears for expected increased production in his own plant, will do well to keep checking the gear price situation through the next quarter. He may find that the easy prices that prevailed in fourth quarter may disappear.

Main Activity—The main upward movement in inquiries has been in heavy gearing. Specials, particularly high precision defense business, dropped in November and thus far there are no indications of any strong recovery. Heavy machinery gears, and small production gears for light tools, draw the greatest buyer interest.

In the fluid transmission field, there have been gains since December. February reports are still scattered, but there are indications that an upward movement is still continuing.

Belts Weak—Belt drive equipment, after fairly strong January levels, dropped in February. While belting moving into the food processing machinery field show strength, there hasn't been any real gain in most other belting markets. Prices here continue soft and give no indication of getting tighter.

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No matter what material your product demands Mundt can supply the exact perforation you need. Steel, brass, copper, monel, bronze, aluminum, zinc, tinplate, lead, stainless steel, coated metals, bonded materials, plastics, and paper are punched as required for every functional and ornamental need.

You can count on Mundt's guarantee that sheets are perfectly flat, straight, parallel on the sides, and free from buckle or camber.

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No job is too small for our careful, personal attention . . . or too large for prompt delivery. Mundt's 90 years' experience is at your disposal.

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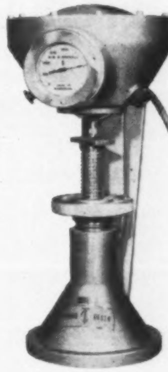

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in hardened stainless steel

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compact
modern design . . . only ½ to ⅓ the size of old nozzle types

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large open orifice
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Bellwood, Illinois

General Demand Inches Market Ahead

The demand for steel is slowly picking up, despite continued automotive cutbacks.

But it is due to many factors, rather than any single industry or any single product.

▪ No particular product is showing any sign of a strong, well defined upturn. But the general pattern is one of a creeping improvement.

There are still soft spots. And automotive markets are becoming especially soft. But general users have just about hit the bottom of the inventory barrel. And this, combined with some seasonal pickups, is enough to push the demand for steel up—a ton at a time.

Seasonal Swing—Miscellaneous users of flat-rolled products are increasing orders almost enough to offset automotive losses. There are scattered improvements in galvanized. Tinplate demand is entering a seasonal upturn for the spring canning market.

A few more bar orders are showing up on the books. And some are being placed as much as a month in advance, compared with one to two weeks only a short time ago. Wire mills are beginning to notice a pickup in orders from merchant products distributors as they rebuild inventories.

Sheet and Strip—For some users, it appears that inventories have reached bottom and are beginning to rebound. But automakers are continuing to adjust their stocks. One of the largest automotive users, whose stocks and buying patterns have been relatively stable, indicates it is going to cut back inventories from a 30-day level to 21 days, according to reports from Detroit. But miscellaneous users are coming into the market in increasing numbers. A Pittsburgh mill says orders for miscellaneous sheets have improved; however, it hasn't been enough to offset auto losses entirely. A Cleveland mill reports "the number of orders is going up regularly, but they're for small amounts. Some of the orders are from customers which haven't been heard from in months." Apparently automotive parts suppliers in the Chicago area cut back too far, too soon. A few have started buying again, just a few weeks after telling mills they intended to trim March orders.

Galvanized and Tinplate—Galvanized sheet is showing "surprising strength," a **Pittsburgh** mill reports. Another says its tinplate orders have picked up sharply. As yet, shipping releases have not kept pace. Daily shipping rate ran a little ahead of January. Mills are being pushed to meet demands for thin tinplate.

Bars—There is little or no advance ordering, but this situation is improving. Customers rush into the market and demand almost immediate delivery. Because of short lead times on orders, projections are difficult. However, **Cleveland** mills say there are a few more orders on the books for March than there were for February at a comparable time. Consequently, mills are carrying as much semi-finished bar stock as possible in order to stay competitive on deliveries. **Chicago** mills are the most optimistic. They report hot-rolled bars continue to show strength. At the same time, the cold-drawn bar market is picking up. On the basis of bookings already received, mills expect March will be up 5 pct over the first two months of the year.

While customers are still reluctant to place orders more than a month in advance, it's an improvement over the recent practice of ordering only a week or two ahead of expected delivery.

Pipe and Tubing—The outlook is a little better, but mostly it's a hopeful attitude. Pipe mills around **Pittsburgh** report encouraging signs, but no real change in orders. Oil country seamless has leveled out at the January rate. However, the drilling rate has moved up and Texas oil quotas have been raised. Standard pipe doesn't show any changes but mills are getting more inquiries for job estimates. Small diameter pipe producers in the **Cleveland** area report residential and commercial construction is picking up again. But large diameter producers are still waiting for new projects to break. East Coast mills are less optimistic.

Wire—Manufacturers wire continues slow, but merchant wire is coming into a seasonal upturn. **Chicago** mills are experiencing another flurry of buying by merchant products distributors. This is usually regarded as an indication of a pretty good year for agricultural and construction buying. **Cleveland** mills say welded wire fabric is beginning to reflect an approaching pickup in construction.

PURCHASING AGENT'S CHECKLIST

Steel buyers, intent on getting fast delivery, are bypassing imports. P. 59

Two new markets may spur sales of lead. P. 62

Material needs in 1960s will be influenced by demands for energy of all types. P. 87

COMPARISON OF PRICES

(Effective February 27, 1961)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	Feb. 27 1961	Feb. 20 1961	Jan. 30 1961	Mar. 1 1960
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	13.55
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	52.00
Tin and Terneplate: (per base box)				
Tin plates (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchants bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	46.75
Wrought iron bars	14.90	14.90	14.90	14.90
Wires: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 10 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	Feb. 27 1961	Feb. 20 1961	Jan. 30 1961	Mar. 1 1960
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.68	$70.68	$70.68	$70.57
Foundry, South Cin'ti	71.92	71.92	71.92	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	70.11	70.11	70.11	70.07
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese, 74-76 pct Mn, cents per lb.‡	11.00	11.00	11.00	11.00
Pig Iron Composites: (per gross ton)				
Pig iron	$66.44	$66.44	$66.44	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$33.50*	$31.50	$30.50	$36.50
No. 1 steel, Phila. area	38.50	38.50	35.50	35.50
No. 1 steel, Chicago	31.50*	30.50	29.50	31.50
No. 1 bundles, Detroit	30.50*	29.50	26.50	32.50
Low phos., Youngstown	38.50*	36.00	34.50	40.50
No. 1 mach'y cast, Pittsburgh	45.50*	44.50	44.50	53.50
No. 1 mach'y cast, Phila.	49.50	49.50	48.50	51.50
No. 1 mach'y cast, Chicago	47.50*	46.50	45.50	53.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$34.50*	$33.50	$31.83	$34.50
No. 2 bundles	24.83*	23.83	22.50	21.83
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	14.75-15.50	14.75-15.50	14.75-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	29.00	29.00	29.00	33.00
Copper, Lake, Conn.	29.00	29.00	29.00	33.00
Tin, Straits, N. Y.	100.50†	100.50	100.50	100.00
Zinc, East St. Louis	11.50	11.50	11.50	13.00
Lead, St. Louis	11.00	11.00	11.00	11.80
Aluminum, ingot	26.00	26.00	26.00	28.10
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. ** Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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Prices Climb To 12-Month High

Scrap prices, pushed by good export demand, continue to climb.

Based on IRON AGE composite prices, present levels are the strongest they've been since February, 1960.

■ Scrap prices, bolstered by strong export demand, continue to rise pushing the market to its strongest level since February, 1960.

Prices moved up sharply in Pittsburgh and Detroit this week. Automotive scrap is $5 higher than one month ago in Pittsburgh. Industrial lists in the Motor City indicate a price rise of $4 over February.

Though the gain in Pittsburgh reflects some increased domestic interest, it's still export demand that's sustaining the market. Most areas report little mill interest at home. In fact, most dealers are sitting on scrap in anticipation of higher prices.

Scrap generation is gaining momentum now that better weather is here. But dealer inventories are still low enough to have a distinct effect on the market.

The IRON AGE composite price for No. 1 heavy melting is up to $34.50 this week. Last March, the composite price for this grade was $33.67. And following months brought even lower prices.

Pittsburgh—Prices moved sharply upward this week as automotive scrap brought $5 more than last month. To some extent, the gain reflects increased general activity and optimism over mill prospects. One local mill paid $28 for No. 2 bundles. A price of $26 for a special grade of turnings is reported in the district. A mill in a nearby district is offering $35 for No. 1 heavy melting scrap.

Chicago—Heavy export demand again forced up Chicago prices. Dealers are sitting tight on existing scrap stocks. While local mills have refused offers of factory bundles at $38 in at least one instance, heavy out-of-area demand has boosted the entire list. Scrap generation, judged by tonnages offered, is off about 40 pct.

Philadelphia—There is still only limited domestic buying here, but export continues strong. However, many scrapmen are concerned over the failure of the Japanese to commit themselves on orders for next quarter. Scrap collections are picking up now that better weather is here.

New York—The market is firmer this week. Higher prices for steelmaking grades, established last week on appraisal, have been confirmed. But the market isn't strong enough to justify further increases. Export continues to be the sole support of this market.

Detroit—Upstate Michigan industrial lists for March indicate prices up to $4 a ton over February. The coming month's scrap output may be 25 to 30 pct below February. Not much is being offered for outside sales. A Chevrolet plant, for example, will turn out 2800 gross tons of busheling this month, but offer only 300 tons for outside sale.

Cleveland — Auto lists jumped $2.50 over previous quotations and $4 over one month ago to lead a generally bullish market. Export demand is again the main push for the relatively small lists for March. Yards have raised the buying price $3 to $4. So scrap collections should start to pick up considerably.

Cincinnati—The market is up $1 on appraisal and scattered broker buying on old orders. Additional increase of at least $1 is expected if area mills are to keep scrap from going out of the district.

St. Louis—Prices made the expected upward move in this area with gains of $1 and $2 in some grades. The overall tone of the market remains strong. Overtures by exporters and out-of-the-area mills for scrap at higher prices have been reported. More scrap than usual is going out of the district.

Birmingham — Heavy rains and floods kept scrap movement near a standstill, but there seems to be a slight increase in buying of foundry steel. Prices of some items rose $1. A Gadsden mill again held up shipments.

Buffalo—Small sales of mixed borings and shoveling turnings were made this week at quoted prices. Mills have indicated they will not be buying any other grades in March. Prices remain unchanged.

Boston — Better weather has brought increased domestic and export activity in this area. Some prices are up $1 on the basis of this increased buying.

West Coast—Scrap inventories in dealers' yards are down to the bone. Rumors persist that the major mills will come back into the market this month. If they do, prices all along the coast will rise.

Houston—The market is quiet because of a brief pause in export activity. The domestic outlook may improve with the resumption of operations at a mill in east Texas. Intake has been hampered by more inclement weather.

How to choose a metal for high-temperature service

In every sense, "the heat's on" and "the pressure's on" when metals go to work at high temperatures. The basic trend in processing equipment has been toward higher pressures, higher temperatures, and more corrosive conditions.

That's why questions like these are being asked today: What metal is used within the core of a gas-cooled reactor where operating temperatures go up to 1700°F? What metal is used for the "skin" of a missile that must take supersonic heats from 400° to 600°F . . . and be the structural framework for 130 tons of dead weight? What metal is used to withstand the corrosion of hot ammonia gas at 900°F? What metal is used for strength and corrosion resistance above 1000°F?

The answer, in each case: Nickel Stainless Steel.

Nickel works as a strengthening and toughening agent. In steel it promotes the formation of austenite, which is stronger and more stable at high temperatures than ferrite. Nickel steps up steel's resistance to oxidation, carburizing, nitriding and thermal fatigue.

The war against corrosion. High-temperature equipment is exposed to a great many different atmospheres and corrosive conditions. Many materials coming from high-temperature processing and handling must be delivered uncontaminated by the products of corrosion. Nickel stainless steels are especially good for fighting corrosion . . . perform well under those oxidizing conditions harmful to unalloyed steel. The stainless steels possess the ability to protect themselves with oxide films that form a shield against corrosion. And *stainless* steel, as the name implies, stays brighter, cleaner . . . and the protective "oxide layer" is less likely to be broken or reduced by pitting or scaling.

What strength means at high temperature. By a mechanism known as "creep" metals at elevated temperatures flow plastically though subjected to stresses below their yield strength, as determined by short-time tensile tests. The creep strength of nickel stainless steels is an important reason for their increasing use in a variety of high-temperature operations. Both *time* and *stress* are design factors at high temperatures. The most generally useful data are those for creep and rupture—one or the other is the basis for most allowable stress values in design work.

The chart below gives the creep and rupture strength data of two nickel stainless steels that have found wide acceptance in high-temperature service:

	CREEP STRENGTH			
	1000°F		1500°F	
AISI TYPE	1% 100,000 hrs,psi	1% 10,000 hrs,psi	1% 100,000 hrs,psi	1% 10,000 hrs,psi
310	17,500	32,500	1,250	3,500
316	14,750	24,500	1,800	4,200

	RUPTURE STRENGTH			
	1000°F		1500°F	
AISI TYPE	100,000 hrs,psi	10,000 hrs,psi	100,000 hrs,psi	10,000 hrs,psi
310	21,000	25,000	1,600	2,800
316	--	--	1,600	3,400

Don't stop at creep and rupture strength . . . other critical questions must be considered in the selection of metals for high-temperature service. They include:

- high temperature ductility
- short-time tensile properties to help evaluate resistance to momentary overloads
- thermal shock resistance

Before selecting a metal for a specific service ask yourself these questions:

☐ What is the maximum temperature of operation?

☐ What kind of temperature cycling will occur?

☐ What maximum load will be encountered? Will it be constant or cyclic?

☐ What types of atmosphere or other corrosive conditions?

☐ What size or shape of the parts or sections?

☐ What further processing will be done, such as welding or machining?

☐ What abrasive or wear conditions will be encountered?

The nickel stainless steel family can serve you in a wide range of high-temperature operations. That's why it's best to bring your metal problem to Inco's High Temperature Engineering Section. They are fully prepared to give you practical answers on the metal that will work best in your application. A note to Inco will bring you the "High Temperature Worksheet" to guide you in describing your metal problem.

LITERATURE

The publications listed below will provide more detailed information on choosing metals for high-temperature service.

PUBLICATION NUMBER	NAME
A266	Heat Resistant Castings, Corrosion Resistant Castings . . . Their Engineering Properties and Applications
A227	Stainless Steel for Pressure Vessels
	High Temperature Corrosion in Refinery and Petrochemical Service
A164	Thermal Expansion Characteristics of Stainless Steels Between −300°F and 1000°F
A248	Compilations of Chemical Compositions and Rupture Strengths of Super-Strength Alloys

A complete listing of Inco publications and technical bulletins can be obtained by writing for "List A" to:

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SCRAP PRICES *(Effective February 27, 1961)*

Pittsburgh

No. 1 hvy. melting	$33.00 to	$34.00
No. 2 hvy. melting	28.00 to	29.00
No. 1 dealer bundles	34.00 to	35.00
No. 1 factory bundles	44.00 to	45.00
No. 2 bundles	27.00 to	28.00
No. 1 busheling	33.00 to	34.00
Machine shop turn.	15.00 to	16.00
Shoveling turnings	20.00 to	21.00
Cast iron borings	19.00 to	20.00
Low phos. punch'gs plate	40.00 to	41.00
Heavy turnings	29.00 to	30.00
No. 1 RR hvy. melting	38.00 to	39.00
Scrap rails, random lgth.	44.00 to	45.00
Rails, 2 ft and under	48.00 to	49.00
RR specialties	45.00 to	46.00
No. 1 machinery cast.	45.00 to	46.00
Cupola cast.	38.00 to	39.00
Heavy breakable cast.	35.00 to	36.00
Stainless		
18-8 bundles and solids	185.00 to	190.00
18-8 turnings	105.00 to	110.00
430 bundles and solids	85.00 to	90.00
410 turnings	60.00 to	65.00

Chicago

No. 1 hvy. melting	$31.00 to	$32.00
No. 2 hvy. melting	28.00 to	29.00
No. 1 dealer bundles	32.00 to	33.00
No. 1 factory bundles	38.00 to	39.00
No. 2 bundles	21.00 to	22.00
No. 1 busheling	31.00 to	32.00
Machine shop turn.	15.00 to	16.00
Mixed bor. and turn.	15.00 to	16.00
Shoveling turnings	17.00 to	18.00
Cast iron borings	16.00 to	17.00
Low phos. forge crops	42.00 to	43.00
Low phos. punch'gs plate, ¼ in. and heavier	39.00 to	40.00
Low phos. 2 ft and under	37.00 to	38.00
No. 1 RR hvy. melting	36.00 to	37.00
Scrap rails, random lgth.	45.00 to	46.00
Rerolling rails	57.00 to	58.00
Rails 2 ft and under	49.00 to	50.00
Angles and splice bars	42.00 to	43.00
RR steel car axles	58.00 to	59.00
RR couplers and knuckles	42.00 to	43.00
No. 1 machinery cast.	47.00 to	48.00
Cupola cast.	42.00 to	43.00
Cast iron wheels	33.00 to	34.00
Malleable	45.00 to	46.00
Stove plate	37.00 to	38.00
Steel car wheels	41.00 to	42.00
Stainless		
18-8 bundles and solids	175.00 to	180.00
18-8 turnings	100.00 to	105.00
430 bundles and solids	90.00 to	95.00
430 turnings	55.00 to	60.00

Philadelphia Area

No. 1 hvy. melting	$38.00 to	$39.00
No. 2 hvy. melting	35.00 to	36.00
No. 1 dealer bundles	40.00 to	41.00
No. 2 bundles	25.00 to	26.00
No. 1 busheling	40.00 to	41.00
Machine shop turn.	13.00 to	14.00
Mixed bor. short turn.	14.00 to	15.00
Cast iron borings	14.00 to	15.00
Shoveling turnings	20.00 to	21.00
Clean cast. chem. borings	25.00 to	26.00
Low phos. 5 ft and under	41.00 to	42.00
Low phos. 2 ft punch'gs	43.00 to	44.00
Elec. furnace bundles	41.00 to	42.00
Heavy turnings	25.00 to	26.00
RR specialties	43.00 to	44.00
Rails, 18 in. and under	50.00 to	52.00
Cupola cast.	37.00 to	38.00
Heavy breakable cast.	38.00 to	39.00
Cast iron car wheels	42.00 to	43.00
Malleable	45.00 to	46.00
No. 1 machinery cast.	49.00 to	50.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$28.50 to	$29.50
No. 2 hvy. melting	26.50 to	27.50
No. 1 dealer bundles	29.50 to	30.50
No. 2 bundles	20.00 to	21.00
Machine shop turn.	10.00 to	11.00
Shoveling turnings	12.00 to	13.00
Cast iron borings	12.00 to	13.00
Low phos. 18 in. and under	37.00 to	38.00
Rails, random length	40.00 to	41.00
Rails, 18 in. and under	46.00 to	47.00
No. 1 cupola cast	37.00 to	38.00
Heavy breakable cast	29.00 to	30.00
Drop broken cast	46.00 to	47.00

Youngstown

No. 1 hvy. melting	$36.00 to	$37.00
No. 2 hvy. melting	24.50 to	25.50
No. 1 dealer bundles	36.00 to	37.00
No. 2 bundles	22.50 to	23.50
Machine shop turn.	15.00 to	16.00
Shoveling turnings	18.00 to	19.00
Low phos. plate	38.00 to	39.00

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Cleveland

No. 1 hvy. melting	$32.50 to	$33.50
No. 2 hvy. melting	22.00 to	23.00
No. 1 dealer bundles	32.50 to	33.50
No. 1 factory bundles	38.50 to	39.50
No. 2 bundles	21.50 to	22.50
No. 1 busheling	32.50 to	33.50
Machine shop turn.	12.00 to	13.00
Mixed bor. and turn.	15.00 to	16.00
Shoveling turnings	15.00 to	16.00
Cast iron borings	15.00 to	16.00
Cut structural & plates, 2 ft & under	38.00 to	39.00
Low phos. punch'gs plate	33.50 to	34.50
Drop forge flashings	32.50 to	33.50
Foundry steel, 2 ft & under	33.00 to	34.00
No. 1 RR hvy. melting	35.00 to	36.00
Rails 2 ft and under	46.00 to	47.00
Rails 18 in. and under	47.00 to	48.00
Steel axle turnings	26.00 to	27.00
Railroad cast	47.00 to	48.00
No. 1 machinery cast	47.00 to	48.00
Stove plate	41.00 to	42.00
Malleable	46.00 to	47.00
Stainless		
18-8 bundles	165.00 to	170.00
18-8 turnings	90.00 to	95.00
430 bundles	80.00 to	85.00

Buffalo

No. 1 hvy. melting	$25.00 to	$26.00
No. 2 hvy. melting	22.00 to	23.00
No. 1 busheling	25.00 to	26.00
No. 1 dealer bundles	25.00 to	26.00
No. 2 bundles	19.00 to	20.00
Machine shop turn.	11.00 to	12.00
Mixed bor. and turn.	12.00 to	13.00
Shoveling turnings	15.00 to	16.00
Cast iron borings	13.00 to	14.00
Low phos. plate	33.00 to	34.00
Structurals and plate, 2 ft. and under	35.00 to	36.00
Scrap rails, random lgth	34.00 to	35.00
Rails 2 ft. and under	44.00 to	45.00
No. 1 machinery cast.	42.00 to	43.00
No. 1 cupola cast.	36.00 to	37.00

St. Louis

No. 1 hvy. melting	$30.00 to	$31.00
No. 2 hvy. melting	26.00 to	27.00
Foundry steel, 2 ft	29.00 to	30.00
No. 1 dealer bundles	30.00 to	31.00
No. 2 bundles	22.00 to	23.00
Machine shop turn.	11.00 to	12.00
Shoveling turnings	13.00 to	14.00
Cast iron borings	20.00 to	21.00
No. 1 RR hvy. melting	33.00 to	34.00
Rails, random lengths	37.00 to	38.00
Rails, 18 in. and under	41.00 to	42.00
RR specialties	39.00 to	40.00
Cupola cast.	40.00 to	41.00
Heavy breakable cast.	31.00 to	32.00
Stove plate	35.00 to	36.00
Cast iron car wheels	33.00 to	34.00
Rerolling rails	49.00 to	50.00
Unstripped motor blocks	33.00 to	34.00

Birmingham

No. 1 hvy. melting	$30.00 to	$31.00
No. 2 hvy. melting	24.00 to	25.00
No. 1 dealer bundles	31.00 to	32.00
No. 2 bundles	19.00 to	20.00
No. 1 busheling	34.00 to	35.00
Machine shop turn.	16.00 to	17.00
Shoveling turnings	18.00 to	19.00
Cast iron borings	10.00 to	11.00
Electric furnace bundles	34.00 to	35.00
Elec. furnace, 3 ft. & under	34.00 to	35.00
Bar crops and plate	39.00 to	40.00
Structural and plae, 2 ft.	38.00 to	39.00
No. 1 RR hvy. melting	33.00 to	34.00
Scrap rail, random lgth.	40.00 to	41.00
Rails, 18 in. and under	45.00 to	46.00
Angles and splice bars	38.00 to	39.00
No. 1 cupola cast.	44.00 to	45.00
Stove plate	44.00 to	45.00
Cast iron car wheels	35.00 to	36.00
Unstripped motor blocks	32.00 to	33.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$28.00 to	$29.00
No. 2 hvy. melting	21.00 to	22.00
No. 2 dealer bundles	16.00 to	17.00
Machine shop turnings	2.00 to	3.00
Mixed bor. and turn.	3.00 to	4.00
Shoveling turnings	5.00 to	6.00
Clean cast. chem. borings	17.00 to	18.00
No. 1 machinery cast.	36.00 to	37.00
Mixed yard cast.	32.00 to	33.00
Heavy breakable cast	30.00 to	31.00
Stainless		
18-8 prepared solids	160.00 to	165.00
18-8 turnings	80.00 to	85.00
430 prepared solids	70.00 to	75.00
430 turnings	20.00 to	25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$27.00 to	$28.00
No. 2 hvy. melting	24.00 to	25.00
No. 1 dealer bundles	30.00 to	31.00
No. 2 bundles	19.00 to	20.00
No. 1 busheling	25.00 to	26.00
Drop forge flashings	23.00 to	24.00
Machine shop turn.	8.00 to	9.00
Mixed bor. and turn.	10.00 to	11.00
Shoveling turnings	11.00 to	12.00
Cast iron borings	10.00 to	11.00
Heavy breakable cast.	26.00 to	27.00
Mixed cupola cast	32.00 to	33.00
Automotive cast.	37.00 to	38.00
Stainless		
18-8 bundles and solids	150.00 to	155.00
18-8 turnings	50.00 to	55.00
430 bundles and solids	55.00 to	60.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$26.50 to	$27.50
No. 2 hvy. melting	21.00 to	22.00
No. 1 dealer bundles	25.00 to	26.00
No. 2 bundles	14.00 to	15.00
No. 1 busheling	26.00 to	27.00
Machine shop turn.	3.00 to	3.50
Shoveling turnings	6.50 to	7.00
Clean cast. chem. borings	13.50 to	14.50
No. 1 machinery cast.	39.00 to	40.00
Mixed cupola cast.	31.00 to	32.00
Heavy breakable cast.	26.50 to	27.50

San Francisco

No. 1 hvy. melting	....	$32.00
No. 2 hvy. melting	....	29.00
No. 1 dealer bundles	$27.00 to	28.00
No. 2 bundles	....	18.00
Machine shop turn.	....	14.00
Cast iron borings	....	14.00
No. 1 cupola cast.	46.00 to	48.00

Los Angeles

No. 1 hvy. melting	....	$30.00
No. 2 hvy. melting	....	27.00
No. 1 dealer bundles	....	25.00
No. 2 bundles	....	17.00
Machine shop turn.	....	12.00
Shoveling turnings	....	13.00
Cast iron borings	....	13.00
Elec. furnace 1 ft. and under (foundry)	....	42.00
No. 1 cupola cast.	....	44.00

Seattle

No. 1 hvy. melting	....	$33.00
No. 2 hvy. melting	....	31.00
No. 2 bundles	....	21.00
No. 1 cupola cast.	....	36.00
Mixed yard cast.	....	31.00

Hamilton, Ont.

Brokers buying prices per net ton on cars:

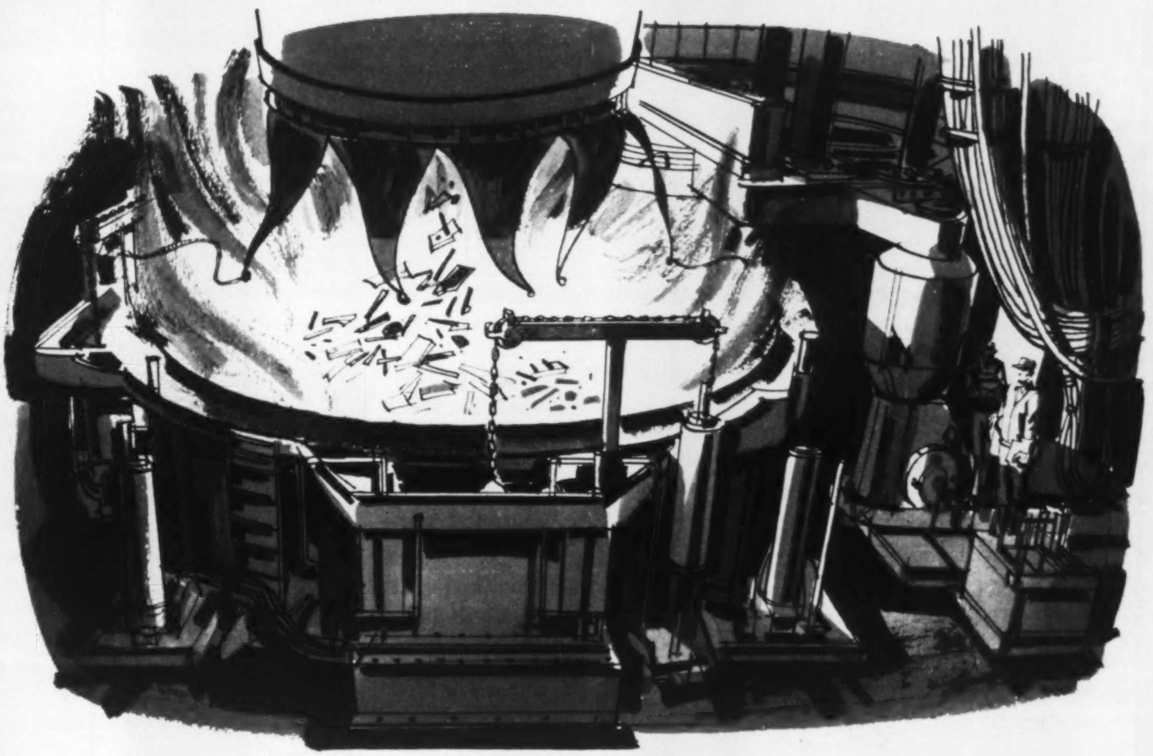
No. 1 hvy. melting	....	$28.50
No. 2 hvy. melting cut 3 ft and under	....	25.00
No. 1 dealer bundles	....	28.50
No. 2 bundles	....	18.00
Mixed steel scrap	....	20.00
Bush., new fact., prep'd.	....	28.50
Bush., new fact., unprep'd.	....	22.00
Machine shop turn.	....	8.00
Short steel turn.	....	12.00
Mixed bor. and turn.	....	12.00
Cast scrap	....	32.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	....	$35.00
No. 2 hvy. melting	....	33.00
No. 2 bundles	....	21.00
Machine shop turn.	....	8.00
Shoveling turnings	....	11.00
Cut structural plate 2 ft & under	$43.00 to	44.00
Unstripped motor blocks	26.00 to	27.00
Cupola cast.	33.00 to	34.00
Heavy breakable cast.	25.00 to	26.00

DANGEROUS INTRUDERS IN IRON AND STEEL SCRAP



COPPER . . . FRIEND OR FOE?

Because it is one of the most adaptable of metals, copper can be used either in its pure state or as an alloy with a wide variety of other metals.

The steel industry values copper as an element in certain steel compositions because it acts as a strengthening agent. Its presence also increases the resistance of steel to the harmful effects of atmospheric corrosion. These qualities make copper an important element in the weight-saving, high strength low alloy steels. For such steels, copper is a friend.

However, if copper enters the furnace as an unknown part of the charge, it becomes an undesired residual element. It will alloy with the molten metal, making the finished steel unfit for its intended use. In certain ranges of composition, it will impair the response of steel to fabrication by hot working or deep drawing. In the electric furnace, it is particularly undesirable. The presence of this non-oxidizable element may make it necessary to divert, or possibly force the scrapping of the entire heat.

When any of these situations occur, copper is a definite foe.

For guaranteed analysis of stainless and alloy steel scrap, look to Luria. Our personnel, equipment and strategically located facilities are specifically geared to work for you. We welcome your inquiry.

Luria Brothers and Company, Inc.

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Aluminum Ties In With Fabricators

Kaiser's purchase of a maker of architectural products is the latest move toward closer association with construction.

It's part of a trend to expand aluminum use in construction, but profitably.

▪ The U. S. aluminum industry is apparently changing its sales approach to its biggest market, building and construction products.

This became evident last week when Kaiser Aluminum & Chemical Co. announced it was merging with the Kawneer Co., makers of aluminum architectural products. Kawneer stockholders will exchange their stock for about $30 million worth of Kaiser stock.

The official statement, from Kaiser president D. A. Rhoades states: "Through Kawneer's association with Kaiser Aluminum we hope to move ahead in expanding the usage of aluminum in the building industry."

Last to Join In—Actually, Kaiser is the last of the Big 3 domestic producers to get into building products. Both Alcoa and Reynolds are already turning them out.

Key factors are the continued growth of this market, and sagging profit margins. Earlier this month the Aluminum Assn. reported that as of Sept. 30, 1960, 27.5 pct of aluminum semi-fabricated products in the U. S. went into building products. On June 30 it was 23.8 pct. And on March 31, 1960 it was only 18.6 pct.

Direct Competition—Part of this has been through aluminum's efforts to compete directly with traditionally cheaper materials. From a marketing view this has proved successful. But profit margins have been trimmed to the bone.

Last year some industry experts decided the best approach was for producers to get closer to consumers and actually make products, such as siding and curtain walls, themselves.

The latest Kaiser move just about confirms acceptance of this idea.

Sobering Outlook — The aluminum industry has some other sobering thoughts to ponder in reappraising its relationship to the building industry. They come from Philip Will Jr., president, American Institute of Architects, at the industry's 75th anniversary celebration at Oberlin College, O.

"The tiny note of alarm is that, within the building market, aluminum may be close to a point of equilibrium. The really right uses of the material become daily more evident and time is underlining the misuses," says Mr. Will.

Some Suggestions—He also has some concrete suggestions:

Aluminum must cease to copy the form and design techniques of other materials.

More new and imaginative forms are needed for which the qualities of aluminum are ideal.

Development of more permanent, uniform protective finishes in attractive colors is necessary.

There have been sentiments akin to Mr. Will's expressed earlier by people in both the aluminum and building industries. It is likely major producers have taken note and will consider them in any new approach to the building market.

Price Increases

Aluminum producers, following the lead of Aluminum Co. of America, have taken some trailer sheets off commodity schedules. This is a relatively narrow area, but the effect is increases of 5¢ to 15¢ per lb for the stock.

There is no sign yet that aluminum will back off the commodity system of pricing in other markets. However, it's an indication of general dissatisfaction with prices.

Four-Owner Plant

Aluminium Ltd. Bridgeport Brass Co., Cerro Corp., and Scovill Mfg. Co. have decided to locate their jointly-owned aluminum hot rolling mill near Oswego, N. Y. (The IRON AGE, Nov. 3, 1960, p. 124.)

The plant will cost the group about $30 million. Actual construction will begin in a few months.

The new plant will turn out aluminum rerolling stock which will be bought by the four co-owners.

Tin prices for the week: Feb. 21—101.75; Feb. 22—Holiday; Feb. 23 — 102.50; Feb. 24 — 102.25; Feb. 25—101.25.*

* Estimate.

Primary Prices

(cents per lb)	current price	last price	date of change
Aluminum Ingot	26.00	24.70	12/17/59
Copper (E)	29.00	30.00	1/16/61
Copper (CS)	29.00	30.00	1/11/61
Copper (L)	29.00	30.00	1/16/61
Lead, St. L.	10.80	11.80	12/13/60
Lead, N. Y.	11.00	12.00	12/13/60
Magnesium Ingot	36.00	34.50	8/13/56
Magnesium pig	35.25	33.75	8/13/56
Nickel	74.00	64.50	12/6/56
Titanium sponge	150-160	162-182	8/1/59
Zinc, E. St. L.	11.50	12.50	1/12/61
Zinc, N. Y.	12.00	13.00	1/12/61

ALUMINUM: 99% Ingot. **COPPER**: (**E**) = electrolytic, (**CS**) = custom smelters, electrolytic. (**L**) = lake. **LEAD**: common grade. **MAGNESIUM**: 99.8% pig Velasco, Tex. **NICKEL**: Port Colborne, Canada. **ZINC**: prime western. Other primary prices, pg. 139.

NONFERROUS PRICES

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.030-.038	.048-.061	.077-.096	.136-.250
1100, 3003	48.4	47.4	46.4	45.4
5052	55.8	53.0	50.8	49.2
6061-0	53.0	50.3	48.4	47.0

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	45.3-46.8	54.0-61.8
18-32	45.8-47.5	58.6-81.5
33-38	49.5-52.2	85.1-96.6
39-44	59.8-63.6	102.0-124.0

Screw Machine Stock—2011-T-3

Size*	7/32-5/16	11/32-23/32	3/4-1 1/16	1 3/32-1 1/2
Price	60.0	59.2	57.7	55.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length*→	72	96	120	144
.019 gage	$1.506	$2.013	$2.515	$3.017

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand, Grade	......	67.9	69.0	77.9	103.1
AZ31B Spec.	......	93.3	96.9	108.7	171.3
Tread Plate	......	70.6	71.7	......	......
Tooling Plate	73.0	......	......	......	......

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade. (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade... (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting)	37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting)	40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	138	120	138
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	130	110	126
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	54.13	....	51.36	55.32
Brass, Yellow	48.10	48.39	48.04	52.26
Brass, Low	50.65	50.94	50.59	54.71
Brass, Red	51.54	51.83	51.48	55.60
Brass, Naval	52.86	59.17	46.67	57.02
Muntz Metal	50.94	....	46.25	....
Comm. Bz.	52.98	53.27	52.92	56.79
Mang. Bz.	56.80	....	50.20	....
Phos. Bz. 5%	74.59	74.34	75.09	76.52

Free Cutting Brass Rod	33.71

TITANIUM

(Base Prices f.o.b. mill)

Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17.00. Plate, HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; bar, HR or forged, commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb otherwise noted)

Antimony, American, Laredo, Tex.	29.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be	$65.00
Beryllium copper, per lb conta'd Be	$43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading	$70.00
Bismuth, ton lots	$ 2.25
Cadmium, del'd	$ 1.50
Calcium, 99.9% small lots	$ 4.55
Chromium, 99.8% metallic base	$ 1.31
Cobalt, 97-99% (per lb)	$1.50 to $ 1.57
Germanium, per gm, f.o.b. Miami, Okla., refined	$29.95 to $36.95
Gold, U. S. Treas., per troy oz.	$35.00
Indium, 99.9% dollars per troy oz.	$ 2.25
Iridium, dollars per troy oz.	$75 to $85
Lithium, 98%	$9.00 to $12.00
Magnesium sticks, 10,000 lb.	57.00
Mercury, dollars per 76-lb flask f.o.b. New York	$208 to $210
Nickel oxide sinter at Buffalo, N. Y., or other U. S. points of entry, contained nickel	69.60
Palladium, dollars per troy oz.	$24 to $26
Platinum, dollars per troy oz.	$82 to $85
Rhodium	$137 to $140
Silver ingots (¢ per troy oz.)	91.375
Thorium, per kg	$43.00
Vanadium	$ 3.65
Zirconium sponge	$ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot	
No. 115	27.25
No. 120	26.25
No. 123	25.25
80-10-10 ingot	
No. 305	31.75
No. 315	29.50
88-10-2 ingot	
No. 210	39.50
No. 215	36.25
No. 245	31.50
Yellow ingot	
No. 405	22.75
Manganese bronze	
No. 421	26.50

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys	
0.30 copper max.	24.25-24.50
0.60 copper max.	24.00-24.25
Piston alloys (No. 132 type)	26.00-27.00
No. 12 alum. (No. 2 grade)	22.75-23.25
108 alloy	23.25-23.75
195 alloy	25.75-26.75
13 alloy (0.60 copper max.)	24.00-24.25
AXS-679 (1 pct zinc)	23.00-24.00

(Effective Feb. 27, 1961)

Steel deoxidizing aluminum notch bar granulated or shot

Grade 1—95-97½%	23.75-24.75
Grade 2—92-95%	22.50-23.50
Grade 3—90-92%	21.50-22.50
Grade 4—85-90%	21.00-22.00

SCRAP METAL

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	25	24¼
Yellow brass	19¼	17⅜
Red brass	22¼	21½
Comm. bronde	23	22¼
Mang. bronze	18⅛	17⅜
Free cutting rod ends.	18⅜	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	25
No. 2 copper wire	23¼
Light copper	21
*Refining brass	21½
Copper bearing material	20¾

*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	24¾
No. 2 copper wire	23¼
Light copper	21
No. 1 composition	20½
No. 1 comp. turnings	19½
Hvy yellow brass solids	15
Brass pipe	14
Radiators	16
Aluminum	
Mixed old cast.	12 —12½
Mixed new clips	13¾—14¼
Mixed turnings, dry	12¾—13¼

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire	21½—22
No. 2 copper wire	19½—20
Light copper	17½—18
Auto radiators (unsweated)	12¼—12¾
No. 1 composition	16¼—16¾
No. 1 composition turnings	15¼—15¾
Cocks and faucets	12¾—13¼
Clean heavy yellow brass	12¼—12¾
Brass pipe	13¼—13¾
New soft brass clippings	13¼—13¾
No. 1 brass rod turnings	13¼—13¾

Aluminum

Alum. pistons and struts	6½— 7
Aluminum crankcase	8½— 9
1100 (Ss) aluminum clippings	11½—12
Old sheet and utensils	8½— 9
Borings and turnings	4½— 5
Industrial castings	9 — 9½
2020 (24s) clippings	10 —10½

Zinc

New zinc clippings	5½— 5¾
Old zinc	2¾— 3
Zinc routings	1¾— 2
Old die cast scrap	1 — 1¼

Nickel and Monel

Pure nickel clippings	52-54
Clean nickel turnings	40
Nickel anodes	52-54
Nickel rod ends	52-54
New Monel clippings	23-23.50
Clean Monel turnings	16.50-17
Old sheet Monel	22-23
Nickel silver clippings, mixed.	18
Nickel silver turnings, mixed.	15

Lead

Soft scrap lead	7 — 7½
Battery plates (dry)	3 — 3¼
Batteries, acid free	2 — 2¼

Miscellaneous

Block tin	73 —75
No. 1 pewter	55 —56
Auto babbitt	41 —42
Mixed common babbitt	9 — 9½
Solder joints	12½—13
Small foundry type	8½— 9
Monotype	8¾— 9¼
Lino. and stereotype	8 — 8¼
Electrotype	7½— 7¾
Hand picked type shells	5¼— 5¾
Lino. and stereo. dross	1¾— 2¼
Electro dross	2 — 2½

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES, STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$104.50 *A2*	$126.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*		5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.525 *A1,T8, M8* 7.525* *M8*	7.575 *W8*		8.40 *W8, S9,13*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5,J3*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1, P11, B9*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Ohio Sharon, Pa.		$99.50 *S1, C10*	$119.00 *C10,S1*					5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh Midland Butler Aliquippa N. Castle McKeesport Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *J3, B4, M10* 7.525 *E3*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*	$140.00 *B2*		6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, City, Ala. Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

* Electro-galvanized-plus galvanizing extras.

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IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Cokes* *1.25*-lb. base box	Electro** *0.25*-lb. base box	Thin *0.25* lb. coating in coils
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*				7.525 *B3*	9.275 *B3*		6.40 *W6*	† Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price 0.75 lb. 0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. **ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb. 0.25 lb. add 65¢.		Prices are for 50 lb. base box; for 45 lb. deduct 15¢; for 55 lb. add 15¢; for 60 lb. add 30¢.
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*				7.575 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*				7.575 *U1*	9.325 *U1*				$9.20 *U1*	$6.35 *U1*
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*	6.775 *B3*		7.525 *B3*	9.275 *B3*	10.025 *B3*	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	$6.25 *B3*
	Worcester, Mass.									6.70 *A5*			
MIDDLE WEST	Alton, Ill.									6.60 *L1*	**Holloware Enameling** *29* ga.—*7.85 U1* at Gary; Pittsburgh; *J3* at Aliquippa; *W5* at Yorkville; *Y1* at Indiana Harbor; *W5* at Wheeling; *7.95 G2* at Granite City.		
	Ashland, Ky.	5.10 *A7*		6.875 *A7*	6.775 *A7*		7.525 *A7*						
	Canton-Massillon, Dover, Ohio			6.875 *R1, R3*									
	Chicago, Joliet, Ill.	5.10 *W8, A1*					7.525 *U1, W8*			6.40 *A5, R3,W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*	7.65 *R3**	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*		6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*				7.525 *G3*	9.275 *G3*					
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3,Y1*	6.275 *U1, I3,Y1*	6.875 *U1, I3*	6.775 *U1, I3,Y1*	7.225 *U1*	7.525 *U1, Y1,I3*	9.275 *U1, Y1*		6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1,Y1*	$6.25 *U1*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*			7.225 *E2*							
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	6.775 *A7*	7.225 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3* 7.65 *R3**	6.775 *S1*	7.225 *S1*†† *R3*	7.525 *R3, S1*	9.275 *R3*				$9.10 *R3*	
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport Pa.	5.10 *U1, J3,P6*	6.275 *U1, J3,P6*	6.875 *U1, J3* 7.50 *E3**	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3*	10.025 *U1, J3*	6.40 *A5, J3,P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	$6.25 *U1*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3,W5*	6.875 *W3, W5* 7.50 *W3**		7.225 *W3, W5*	7.525 *W3*	9.275 *W3*			$10.40 *W5, W3*	$9.10 *W5, W3*	$6.40*W5*** $6.25 *W3*
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*		6.775 *Y1*		7.525 *Y1*	9.275 *Y1*		6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*				8.25 *K1*	10.40 *K1*			$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*	6.775 *T2*					6.40 *T2,R3*	$10.50 *T2*	$9.20 *T2*	$6.35 *T2*
	Houston, Texas									6.65 *S2*			

* Electrogalvanized sheets. ** For 55 lb.; for 60 lb. add 15¢.

†† 7.425 at Sharon; Niles is 7.225.

(Effective Feb. 27, 1961)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*	5.675 *R3,B3*	7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *P2*	6.375*P2*	7.50 *P2*	7.95 *P2*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Milton, Pa.	5.825 *M7*	5.825 *M7*									
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*	5.675 *B3*		6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Steelton, Pa.		5.675 *B3*									
	Fairless, Pa.	5.825 *U1*	5.825 *U1*									
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.		5.675 *B3*					5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7, A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*	5.675 *U1,R3, N4,P13,W8* 5.875*L1*	7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,I3*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*	5.675 *R3*	7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Plymouth, Mich.	5.675 *G3*	5.675 *G3*	7.90 *P3* 7.85 *P8B5H2* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*	5.675 *U1,I3, Y1*	7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, I1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.		5.775 *C9*									8.10 *C9*
	Sterling, Ill.	5.775 *N4*	5.775 *N4*				7.925 *N4*	5.30 *N4*			7.625 *N4*	8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*	5.675 *U1,J3*	7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Youngstown, Steubenville, O.	5.675 *U1,R3, Y1*	5.675 *U1,R3, Y1*	7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1,W5, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.425 *J5* 6.375 *K1*	6.425 *J5* 6.375 *K1*		7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*	5.675 *S2*		6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*	6.375 *C7,B2*	9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*	6.125 *C6*					6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*	6.425 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*	6.375 *C7* 6.425 *B2*				9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*	6.425 *B2,A10*		7.825 *B2*		9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga.	5.875 *A8*	5.25 *A8*									8.00 *A8*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*	5.675 *T2,R3, C16*	8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas, Sand Springs, Okla.	5.925 *S2*	5.675 *S2*		6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher.

(Effective Feb. 27, 1961)

* Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1	Acme Steel Co., Chicago
A2	Alan Wood Steel Co., Conshohocken, Pa.
A3	Allegheny Ludlum Steel Corp., Pittsburgh
A4	American Cladmetals Co., Carnegie, Pa.
A5	American Steel & Wire Div., Cleveland
A6	Angel Nail & Chaplet Co., Cleveland
A7	Armco Steel Corp., Middletown, Ohio
A8	Atlantic Steel Co., Atlanta, Ga.
A9	Acme-Newport Steel Co., Newport, Ky.
A10	Alaska Steel Mills, Inc., Seattle, Wash.
B1	Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2	Bethlehem Steel Co., Pacific Coast Div.
B3	Bethlehem Steel Co., Bethlehem, Pa.
B4	Blair Strip Steel Co., New Castle, Pa.
B5	Bliss & Laughlin, Inc., Harvey, Ill.
B6	Brooke Plant, Wickwire Spencer Steel Div., Birdsboro, Pa.
B7	A. M. Byers, Pittsburgh
B8	Braeburn Alloy Steel Corp., Braeburn, Pa.
B9	Barry Universal Corp., Detroit, Mich.
C1	Calstrip Steel Corp., Los Angeles
C2	Carpenter Steel Co., Reading, Pa.
C6	Colorado Fuel & Iron Corp., Denver
C7	Columbia Geneva Steel Div., San Francisco
C8	Columbia Steel & Shafting Co., Pittsburgh
C9	Continental Steel Corp., Kokomo, Ind.
C10	Copperweld Steel Co., Pittsburgh, Pa.
C11	Crucible Steel Co. of America, Pittsburgh
C13	Cuyahoga Steel & Wire Co., Cleveland
C14	Compressed Steel Shafting Co., Readville, Mass.
C15	G. O. Carlson, Inc., Thorndale, Pa.
C16	Connors Steel Div., Birmingham
C18	Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.
D1	Detroit Steel Corp., Detroit
D2	Driver, Wilbur B., Co., Newark, N. J.
D3	Driver Harris Co., Harrison, N. J.
D4	Dickson Weatherproof Nail Co., Evanston, Ill.
E1	Eastern Stainless Steel Corp., Baltimore
E2	Empire-Reeves Steel Corp., Mansfield, O.
E3	Enamel Products & Plating Co., McKeesport, Pa.
F1	Firth Sterling, Inc., McKeesport, Pa.
F2	Fitzsimons Steel Corp., Youngstown
F3	Follansbee Steel Corp., Follansbee, W. Va.
G2	Granite City Steel Co., Granite City, Ill.
G3	Great Lakes Steel Corp., Detroit
G4	Greer Steel Co., Dover, O.
G5	Green River Steel Corp., Owenboro, Ky.
H1	Hanna Furnace Corp., Detroit
H2	Hercules Drawn Steel Corp., Toledo, O.
I2	Ingersoll Steel Div., New Castle, Ind.
I3	Inland Steel Co., Chicago, Ill.
I4	Interlake Iron Corp., Cleveland
J1	Jackson Iron & Steel Co., Jackson, O.
J2	Jessop Steel Corp., Washington, Pa.
J3	Jones & Laughlin Steel Corp., Pittsburgh
J4	Joslyn Mfg. & Supply Co., Chicago
J5	Judson Steel Corp., Emeryville, Calif.
K1	Kaiser Steel Corp., Fontana, Calif.
K2	Keystone Steel & Wire Co., Peoria
K4	Keystone Drawn Steel Co., Spring City, Pa.
L1	Laclede Steel Co., St. Louis
L2	La Salle Steel Co., Chicago
L3	Lone Star Steel Co., Dallas
L4	Lukens Steel Co., Coatesville, Pa.
M1	Mahoning Valley Steel Co., Niles, O.
M2	McLouth Steel Corp., Detroit
M3	Mercer Tube & Mfg. Co., Sharon, Pa.
M4	Mid States Steel & Wire Co., Crawfordsville, Ind.
M7	Milton Steel Products Div., Milton, Pa.
M8	Mill Strip Products Co., Evanston, Ill.
M9	Moltrup Steel Products Co., Beaver Falls, Pa.
M10	Mill Strip Products Co., of Pa., New Castle, Pa.
N1	National Supply Co., Pittsburgh
N2	National Tube Div., Pittsburgh
N4	Northwestern Steel & Wire Co., Sterling, Ill.
N6	Northwest Steel Rolling Mills, Seattle
N7	Newman Crosby Steel Co., Pawtucket, R. I.
N8	Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9	Nelson Steel & Wire Co.
O1	Oliver Iron & Steel Co., Pittsburgh
O2	Oregon Steel Mills, Portland
P1	Page Steel & Wire Div., Monessen, Pa.
P2	Phoenix Steel Corp., Phoenixville, Pa.
P3	Pilgrim Drawn Steel Div., Plymouth, Mich.
P4	Pittsburgh Coke & Chemical Co., Pittsburgh
P6	Pittsburgh Steel Co., Pittsburgh
P7	Portsmouth Div., Detroit Steel Corp., Detroit
P8	Plymouth Steel Co., Detroit
P9	Pacific States Steel Co., Niles, Cal.
P10	Precision Drawn Steel Co., Camden, N. J.
P11	Production Steel Strip Corp., Detroit
P13	Phoenix Mfg. Co., Joliet, Ill.
P14	Pacific Tube Co.
P15	Philadelphia Steel and Wire Corp.
R1	Reeves Steel & Mfg. Div., Dover, O.
R2	Reliance Div., Eaton Mfg. Co., Massillon, O.
R3	Republic Steel Corp., Cleveland
R4	Roebling Sons Co., John A., Trenton, N. J.
R5	Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6	Rodney Metals, Inc., New Bedford, Mass.
R7	Rome Strip Steel Co., Rome, N. Y.
S1	Sharon Steel Corp., Sharon Pa.
S2	Sheffield Steel Div., Kansas City
S3	Shenango Furnace Co., Pittsburgh
S4	Simonds Saw and Steel Co., Fitchburg, Mass.
S5	Sweet's Steel Co., Williamsport, Pa.
S7	Stanley Works, New Britain, Conn.
S8	Superior Drawn Steel Co., Monaca, Pa.
S9	Superior Steel Div. of Copperweld Steel Co..
S10	Seneca Steel Service, Buffalo
S11	Southern Electric Steel Co., Birmingham
S12	Sierra Drawn Div., Bliss & Laughlin, Inc., Los Angeles, Calif.
S13	Seymour Mfg. Co., Seymour, Conn.
S14	Screw and Bolt Corp. of America, Pittsburgh, Pa.
T1	Tonawanda Iron Div., N. Tonawanda, N. Y.
T2	Tennessee Coal & Iron Div., Fairfield
T3	Tennessee Products & Chem. Corp., Nashville
T4	Thomas Strip Div., Warren, O.
T5	Timken Steel & Tube Div., Canton, O.
T7	Texas Steel Co., Fort Worth
T8	Thompson Wire Co., Boston
U1	United States Steel Corp., Pittsburgh
U2	Universal Cyclops Steel Corp., Bridgeville, Pa.
U3	Ulbrich Stainless Steels, Wallingford, Conn.
U4	U. S. Pipe & Foundry Co., Birmingham
W1	Wallingford Steel Co., Wallingford, Conn.
W2	Washington Steel Corp., Washington, Pa.
W3	Weirton Steel Co., Weirton, W. Va.
W4	Wheatland Tube Co., Wheatland, Pa.
W5	Wheeling Steel Corp., Wheeling, W. Va.
W6	Wickwire Spencer Steel Div., Buffalo
W7	Wilson Steel & Wire Co., Chicago.
W8	Wisconsin Steel Div., S. Chicago, Ill.
W9	Woodward Iron Co., Woodward, Ala.
W10	Wyckoff Steel Co., Pittsburgh
W12	Wallace Barnes Steel Div., Bristol, Conn.
Y1	Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities		Sheets			Strip	Plates	Shapes	Bars		Alloy Bars			
	City Delivery‡ Charge	Hot-Rolled (18 ga. & hvr.)	Cold-Rolled (15 gage)	Galvanized (10 gage)††	Hot-Rolled		Standard Structural	Hot-Rolled (merchant)	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		9.37	10.61	11.83	10.85	9.73	9.94	9.53	13.24	......	......	......	......
Baltimore	$.10	7.87	9.71	10.16	10.28	8.44	9.13	8.65	11.80	17.48	16.48	21.58	20.83
Birmingham		8.46	10.20	10.69	9.45	8.41	8.47	8.26	13.14	16.76	16.76	......	......
Boston	.10	9.84	10.68	11.87	12.26	9.72	10.26	9.87	13.45	17.79	16.69	23.89	21.04
Buffalo	.15	8.70	9.45	11.40	11.15	8.80	9.30	8.90	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	9.37	10.35	10.85	11.54	9.21	9.72	9.37	10.80	17.10	16.10	21.20	20.45
Cincinnati**	.15	9.53	10.41	10.90	11.86	9.59	10.29	9.48	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	9.37^{1}	10.81	11.07	11.66	9.45	10.11	9.69	11.40	17.21	16.21	21.31	20.56
Denver		10.90	12.53	13.27	13.07	10.74	11.24	10.88	12.97	......	......	......	20.84
Detroit**	.15	9.63	10.61	11.20	11.91	9.58	10.29	9.68	11.16	17.38	16.38	21.48	20.73
Houston**		10.17	10.98	11.35^{3}	11.73	9.90	9.81	9.58	13.10	17.50	16.55	21.55	20.85
Kansas City	.15	9.59	11.42	10.95	11.76	9.43	9.93	9.57	11.77	17.17	15.87	21.87	21.12
Los Angeles		9.50^{1}	11.20	12.20	11.29	9.82	10.54	9.67	14.20	18.30	17.35	22.90	22.20
Memphis	.15	9.13	10.50	......	10.79	8.81	9.16	8.97	12.89	......	......	......	......
Milwaukee**	.15	9.51	10.49	10.99	11.68	9.35	9.94	9.51	11.04	17.24	16.24	21.24	20.49
New York	.10	9.77	10.23	11.45	11.56	9.61	10.30	9.84	13.35	17.50	16.50	21.60	20.85
Norfolk	.20	8.20	......	......	8.90	8.65	9.20	8.90	10.70	......	......	......	......
Philadelphia	.10	8.95	10.10	10.99	10.45	8.80	9.05	8.85	12.05	17.48	16.48	21.58	20.83
Pittsburgh**	.15	9.37	10.81	11.83	11.64	9.21	9.72	9.37	11.40	17.10	16.10	21.20	20.45
Portland		9.45	11.30	12.35	11.45	9.60	10.05	9.45	16.65	18.60	17.80	22.70	22.20
San Francisco	.10	10.27	11.79^{2}	11.50	11.88	10.48	10.59	10.17	15.20	18.30	17.35	22.90	22.20
Seattle		10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.20	18.60	17.80	22.70	22.15
Spokane	.15	10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.35	17.75	17.95	21.58	22.30
St. Louis**	.15	9.57	10.75	11.23	11.74	9.43	9.95	9.59	11.43	17.48	16.48	21.58	20.83
St. Paul	.15	9.72	10.39	11.54	11.89	9.56	10.07	9.72	11.64	......	16.69	......	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. **These cities are on order quantity pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—⅛" x 1"; Plate—¼" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—¾-2 13/16; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅝" to 2⅞"; cold drawn—15/16" to 2⅞" round; Hot-rolled 4140—⅝" to 2⅞" round. cold drawn—15/16" to 2⅞" round.

†† 13¢ zinc. ‡ Deduct for country delivery. ^{1} 15 ga. & heavier; ^{2} 14 ga. & lighter. ^{3} 10 ga. x 48 — 120.

(Effective Feb. 27, 1961)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	66.50		
Birmingham *W9*	62.00	62.50*	66.50		
Birmingham *U4*	62.00	62.50*	66.50		
Buffalo *R3*	66.00	66.50	67.00	67.50	
Buffalo *H1*	66.00	66.50	67.00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	
Chester *P2*	68.00	68.50	69.00		
Chicago *I4*	66.00	66.50	66.50	67.00	
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Fontana *K1*	75.00	75.50			
Geneva, Utah *C7*	66.00	66.50			
Granite City *G2*	67.90	68.40	68.90		
Hubbard *Y1*			66.50		
Ironton, Utah *C7*	66.00	66.50			
Lyles, Tenn. *T3*					73.00
Midland *C11*	66.00				
Minnequa *C6*	68.00	68.50	69.00		
Monessen *P6*	66.00				
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*		66.50	67.00	67.50	
Rockwood *T3*	62.00	62.50	66.50	67.00	73.00
Sharpsville *S3*	66.00		66.50	67.00	
So. Chicago *R3*	66.00	66.50	66.50	67.00	
So. Chicago *W8*	66.00		66.50	67.00	
Swedeland *A2*	68.00	68.50	69.00	69.50	71.00†
Toledo *I4*	66-00	66.50	66.50	67.00	
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*			66.50		

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel.

Add $1.00 for 0.31-0.69 pct phos. Add 50¢ per gross ton for truck loading charge.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1*, *I4*, Toledo, *I4*, $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75¢ per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 13 pct; 13 to 13.5 pct; 13.5 to 14 pct, add $1. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based on latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container)	*Pct*
Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container)	*Pct*
Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)

Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

(On all the above categories add 25 pct for less than container quantities. Minimum plating charge—$10.00 per item. Price on application assembled to bolts.)

Machine Screws and Stove Bolts

(Packages—plain finish)

	Discount Screws	Discount Bolts
Full Cartons	46	46

Machine Screws—bulk

¼ in. diam or smaller	25,000 pcs	50
5/16, ⅜ & ½ in. diam	15,000 pcs	50

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	25.00	28.25	26.00	29.50– 32.75	32.00	29.50– 34.50	47.50	38.00	46.50	—	19.25– 21.50	—	19.75 21.75
Billets, forging	—	37.75	38.75	39.50	42.50	39.50	64.50	48.75	57.75	29.25	29.25	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	46.75	75.75	57.50	67.25	35.00	35.00	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25 31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	40.50	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	42.50	40.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	44.25	71.75	54.50	63.75	33.25	33.25	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5*.

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown, *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13*, (25¢ per lb. higher); New Bedford, Mass., *R6* Gary, *U1*, (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7*.

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1*.

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1*.

Forging billets: Ambridge Pa., *B7;* Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa., *C2*.

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

	Discount Hex	Discount Square
Full Cartons	46	57
Bulk		
¼ in. diam or smaller	25,000 pcs	
5/16 or ⅜ in. diam	56	60
	15,000 pcs	
	56	60

Rivets

	Base per 100 *lb*
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	15

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1960 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

(Effective Feb. 27, 1961)

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails Col	Woven Wire Fence Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*	173	187		212	193	9.00	9.55
Aliquippa *J3****	173	190			190	9.00	9.675
Atlanta *A8***	173	191		212	197	9.00	9.75
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*						9.00	9.55*
Chicago *N4*	173	191	177	212	197	9.00	9.75
Chicago *R3*						9.00	9.55
Chicago *W7*	173					9.00	9.55†
Cleveland *A6*							
Cleveland *A5*						9.00	
Crawf'dav. *M4***	175	193		214	199	9.10	9.85
Donora Pa. *A5*	173	187		212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187		212	193	9.00	9.55
Galveston *D4*	9.10‡						
Houston *S2*	178	192		217	198	9.25	9.80†
Jacksonville *M4*	184-1	197		219	203	9.10	9.775
Johnstown *B3***	173	190	177		196	9.00	9.675
Joliet Ill. *A5*	173	187		212	193	9.00	9.55
Kokomo *C9**	175	189		214	195*	9.10	9.65*
L. Angeles *B2****						9.95	10.625
Kansas City *S2**	178	192		217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass *W6*						9.30	9.85*
Pittsburg, Cal. *C7*	192	210			213	9.95	10.50
Rankin Pa. *A5*	173	187			193	9.00	9.55
So. Chicago *R3*	173	187			193	8.65	9.20
S. San Fran. *C6*				236		9.95	10.50
Sparrows Pt. *B3***	175			215	198	9.10	9.775
Struthers, O. *Y1**						8.65	9.20
Worcester *A5*	179					9.30	9.85
Williamsport *S5*							

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

STANDARD T. & C.	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½–3 In.		2 In.		2½ In.		3 In.		3½–4 In.	
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Youngstown *R3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fontana *K1*	*10.75	*26.00	*7.75	*22.00	*4.25	*17.50	*1.75	*16.75	*1.25	*15.75	*0.75	*15.25	0.75	*15.50								
Pittsburgh *J3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Alton, Ill. *L1*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Sharon *M3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fairless *N2*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Pittsburgh *N1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*7.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Wheeling *W5*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Wheatland *W4*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Youngstown *Y1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Indiana Harbor *Y1*	1.25	*14.0	4.25	*10.0	7.75	*5.50	10.25	*4.75	10.75	*3.75	11.25	*3.25	12.75	*3.50								
Lorain *N2*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Youngstown *R3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Fairless *N2*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Fontana *K1*	*6.25		*2.25		0.75		1.25		1.75		2.25		2.75									
Pittsburgh *J3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Alton, Ill. *L1*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Sharon *M3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Pittsburgh *N1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Wheeling *W5*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Wheatland *W4*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Youngstown *Y1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Indiana Harbor *Y1*	5.75	*8.0	9.75	*4.0	12.75	0.50	13.25	*0.75	13.75	0.25	14.25	0.75	14.75	*0.50								
Lorain *N2*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 11.50¢ per lb.

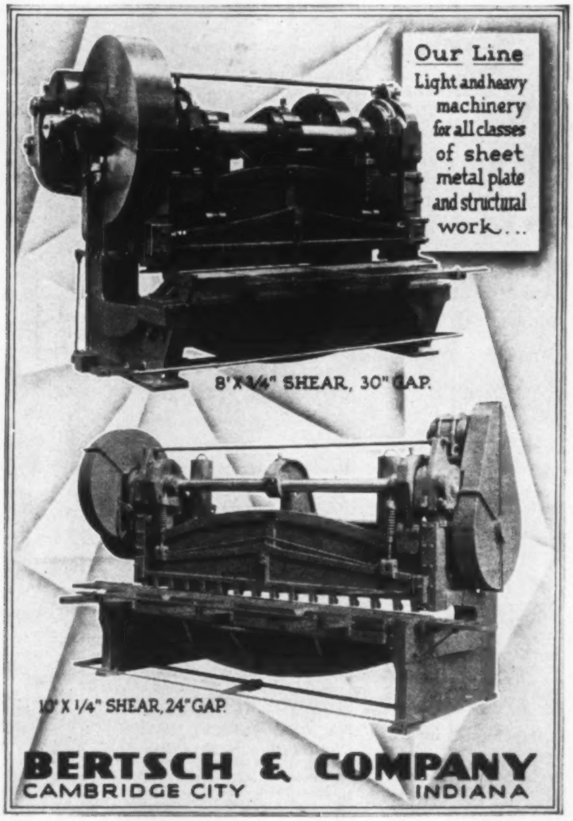
CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.6
Chicago	140.0
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

COKE

Furnace, beehive (f.o.b.)	Net-Ton
Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Chattanooga, Tenn.	30.80
Ironton, O., f.o.b.	30.50
Detroit, f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearny, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75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CAMBRIDGE CITY INDIANA

stack-molding gives you lower-cost castings

This 2¼-pound gray iron casting is a generator part for an automotive electrical system.

COSTS were CUT by casting 60 at a time . . . 5 to a mold . . . 12 molds high.

If you have high-volume requirements for fairly flat parts . . . investigate STACK-MOLDING.

to fill your IMMEDIATE NEEDS for QUALITY PRECISION CASTINGS at LOWER COST

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HIGH STRENGTH . . . Heat-treating facilities available to provide any desired properties.

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GL GREAT LAKES FOUNDERS & MACHINE CORP.
LUDINGTON, MICH.

Specialists in Stack-, CO₂, and Shell-Mold Casting

FERROALLOY PRICES

Ferrochrome

Cents per lb contained Cr, lump, bulk, carloads, del'd. 65-71% Cr, .30-1.00% max. Si.

0.02% C....	41.00	0.50% C....	33.25
0.05% C....	34.00	1.00% C....	33.00
0.10% C....	33.75	1.50% C....	32.75
0.20% C....	33.50	2.00% C....	32.50

3-5% C, 53-63% Cr, 2.5% max. Si	26.00
4-6% C, 58-63% Cr, 3-6% Si	22.50
5-8% C, 58-63% Cr, 3-6% Si	22.50
6-8% C, 50-56% Cr, 4-7% Si	22.00
4.00-4.50% C, 60-70% Cr, 1.2% Si	28.75
0.025% C (Simplex)	31.50
0.010% C max, 63-66% Cr, 5-7% Si.	32.50
0.010% C max, 68-71% Cr, 2% Si max	31.50
0.25% C max	33.50

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max. 0.10% C price schedule.

Chromium Metal

Per lb chromium, contained, packed delivered, ton lots, 97.25% min. Cr, 1% max. Fe.

0.10% max. C	$1.29
9 to 11% C, 88-91% Cr, 0.75% Fe	1.38

Electrolytic Chromium Metal

Per lb of metal 2" x D plate (⅛" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.

Carloads	$1.15
Ton lots	1.17
Less ton lots	1.19

Low Carbon Ferrochrome Silicon

(Cr 39-41%, Si 42-45%, C 0.05% max.) Carloads, delivered, lump, 3-in x down, packed.

Price is sum of contained Cr and contained Si.

	Cr	Si
Carloads, bulk	22.50	14.60
Ton lots	30.45	16.05
Less ton lots	33.40	17.70

Calcium-Silicon

Per lb of alloy, lump, delivered, packed. 30-33% Cr, 60-65% Si, 3.00 max. Fe.

Carloads, bulk	24.00
Ton lots	27.95
Less ton lots	29.45

Calcium-Maganese—Silicon

Cents per lb of alloy, lump, delivered, packed.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads, bulk	23.00
Ton lots	26.15
Less ton lots	27.15

SMZ

Cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.

Ton lots	21.15
Less ton lots	22.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed max. St. Louis, V-5: 38-42% Cr, 17-19% Si, 8-11% Mn, packed.

Carload lots	18.45
Ton lots	19.95
Less ton lots	21.20

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload bulk	19.20
Ton lots to carload packed	21.15
Less ton lots	22.40

Ferromanganese

Maximum base price, f.o.b., lump size, base content 74 to 76 pct Mn. Carload lots, bulk.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	11.00
Houston, Tex.	11.00
Johnstown, Pa.	11.00
Lynchburg, Va.	11.00
Neville Island, Pa.	11.00
Sheridan, Pa.	11.00
Philo, Ohio	11.00
Rockwood, Tenn.	11.00
S. Duquesne	11.00

Add or substract 0.1¢ for each 1 pct Mn above or below base content.

Briquets, delivered, 66 pct Mn:

Carloads, bulk	13.70
Ton lots packed in bags	16.10

Spiegeleisen

Per gross ton, lump, f.o.b., 3% Si max.

Mn	Palmerton, Pa. 10 lb, pig	Palmerton, Pa. 35 lb, down	Neville Is., Pa. 35 lb
16-19%	$98.00	$96.00	$100.50
19-21%	100.00	98.00	102.50
21-23%	102.50	100.00	105.50

Manganese Metal

2 in. x down, cents per pound of metal delivered.

95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed	45.75
Ton lots	47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.

Carloads, bulk	34.25
Ton lots, palletized	36.25
250 to 1999 lb	39.00
Premium for Hydrogen - removed metal	0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max., carloads, lump, bulk, delivered, per lb of contained Mn 24.00

Low-Carb Ferromanganese

Cents per pound Mn contained, lump size, packed, del'd Mn 85-90%.

	Carloads (Bulk)	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C	31.10	33.90	35.10
0.30% max. C	29.80	32.60	33.80
0.50% max. C	28.50	31.30	32.50
0.75% max. C, 80.85% Mn, 5.0-7.0% Si	27.00	29.80	31.00

Silicomanganese

Lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.3¢ f.o.b. shipping point.

Carloads bulk	11.60
Ton lots, packed	13.25
Carloads, bulk, delivered, per lb of briquet	14.00
Briquets, packed pallets, 2000 lb up to carloads	16.40

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct., f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $106.50 gross ton, frieght allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Cents per pound contained Si, lump size, delivered, packed.

	Ton lots,	Carloads,
98.25% Si, 0.50% Fe	22.95	21.65
98% Si, 1.0% Fe	21.95	20.65

Silicon Briquets

Cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.

Carloads, bulk	8.00
Ton lots, packed	10.80

Electric Ferrosilicon

Cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si....	14.60	75% Si....	16.90
65% Si....	15.75	85% Si....	18.60
90% Si....	20.00		

Ferrovanadium

50-55% V delivered, per pound, contained V, in any quantity.

Openhearth	3.20
Crucible	3.30
High speed steel	3.40

Calcium Metal

Eastern zone, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
100 to 1999 lb	2.40	3.30	4.55

(Effective Feb. 27, 1961)

Alsifer, 20% Al, 40% Si, 40% Fe, f.o.b. Suspension Bridge, N. Y. per lb.

Carloads, bulk	9.85¢
Ton lots	11.20¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo	$1.50

Ferrocolumbium, 58-62% Cb, 2 in. x D, del'd per lb con't Cb

Ton lots	$3.45
Less ton lots	3.50

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, del'd ton lots, 2-in. x D per lb con't Cb plus Ta	$3.40
Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo	$1.76

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $5.00 unitage,

per gross ton	$120.00
10 tons to less carload	$131.00

Ferrotitanium, 40% regular grade 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots, per lb contained Ti	$1.35

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots,

per lb contained Ti	$1.50
Less ton lots	$1.54

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton	$255.00
Ferrotungsten, ¼ x down packed per pounds contained W, ton lots delivered	$2.15 (nominal)

Molybdic oxide, briquets per lb. contained Mo, f.o.b. Langeloth,

Pa.	$1.49
bags, f.o.b. Washington, Pa., Langeloth, Pa.	$1.38

Simanal, 20% Si, 20% Mn, 20% Al, f.o.b. Philo, Ohio, freight allowed per lb.

Carload, bulk lump	18.50¢
Ton lots, packed lump	20.50¢
Less ton lots	21.00¢

Vanadium oxide, 86-89% V_2O_5 per pound contained V_2O_5	$1.38

Zirconium silicon, per lb of alloy

35-40% del'd, carloads, bulk	26.25¢
12-15%, del'd lump, bulk-carloads	9.25¢

Boron Agents

Borosil, per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B

2000 lb carload	$5.50

Ferro Zirconium Boron, Zr 50% to 60%, B 0.8% to 1.0%, Si 8% max., C 8% max., Fe balance, f.o.b. Niagara Falls, New York, freight allowed, in any quantity per pound	30¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5%, f.o.b., Suspension Bridge, N. Y., freight allowed.

Ton lots per pound	18.25¢

Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots	$1.20

F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up

10 to 14% B	.85
14 to 19%	1.20
19% min. B	1.50

Grainal, f.o.b. Cambridge, O., freight, allowed, 100 lb & over

No. 1	$1.05
No. 79	50¢

Manganese-Boron, 75.00% Mn, 17.50% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd

Ton lots (packed)	$1.46
Less ton lots (packed)	1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots	2.15

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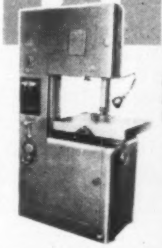
Set your speed from 40 to 4600 SFM instantly . . . while machine is running!

See how much you save in speed change-over time as you switch from one stock to another instantly . . . ferrous and non-ferrous metals, wood, plastic and similar materials.



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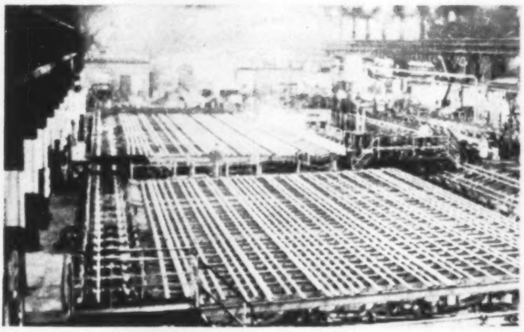
Another example of component engineering for the automation of the Metals Industry:

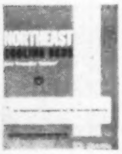


Continuously running Cooling Racks. Each is 220' long by 9'4" wide and consists of 56 strands of chain on 4'6" centers. Stationary channels are placed between chain supports to rotate elements as they cool, to assure a straighter, more uniform product.

The illustrated subject is one of two mechanical Cooling Beds built to handle reinforcing bars automatically and efficiently in a leading Pennsylvania mill.

Designed by a team of Northeast Engineers to perform a specific operation, they are chain-type beds with adjustable speed drives at either end of the headshafts. Each will handle a full range of bar sizes—on a 90,000 ton per year basis.

Northeast Engineers, working as a creative group, are daily solving mechanical problems to increase production and make individual operations or the total plant concept more economical. A Northeast team is available for your next improvement or plant expansion.



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330 North Main St., Columbiana, Ohio

GUARANTEED—RE-NU-BILT

Electric Power Equipment — A. C. Motors

3 phase—60 cycle

SYNCHRONOUS

Qu.	H.P.	Make	Type	Volts	Speed
1	6000	G.E.	ATI. 8P.F.	2200/6600	600
1	3500	G.E.	TS 1.0P.F.	4600/2300/4000	360
2	1750	G.E.	ATI	2300	3600
2	500	G.E.	TS 7569	2200	1200
1	400	G.E.	TS 7565	2200	1200
1	325	G.E.	ATI 1.0P.F.	440	1800
2	300	ElMach.	BRKT	2200	1200

SLIP RING

Qu.	H.P.	Make	Type	Volts	Speed
1	1750	G.E.	M-579S	4800	1800
1	800	Whse.	CW	500	1776
1	800	G.E.	MT-428	2300	450
1	600	Whse.	CW 4-32-D-15	440	1778
1	550	Whse.	CW	440	252
1	500	Whse.	CW	550	350
1	300	A.C.	ANY	440/2300	720
1	300	G.E.	MTP-561	2200	1800
1	250	G.E.	IM-16	220/440	875
1	250	Cr.Wh.	Size 29Q	2300	350
1	250	G.E.	MT-424Y	4000	257
1	200	G.E.	IE-13B	220	1890
2	200	Whse.	CW-890	2300	1775
1	200	G.E.	IM	2200	580
1	200	G.E.	IM	440	435
1	125	G.E.	MT-557	220/440	1200
1	125	A.C.	ARY	440	870
3	100	A.C.		440	695
1	100	G.E.	M-6335Z	220/440	580
1	100	Whse.	CW-754C	220/440	900

SQUIRREL CAGE

Qu.	H.P.	Make	Type	Volts	Speed
3	1500	G.E.	K	2200	3580
1	500	G.E.	FT-559AY	2200	3600
1	500	Whse.	CS-1115	2300	863/445
2	500	Whse.	CSP-583H	440	3600
4	500	A.C.	ARW	2300	3600
4	500	Whse.	CS-1216	2200	500
2	450	Ell.	F-3910	2200	1200
1	400	Whse.	CS-7151-610H	6600/4000	3565
1	300	Cont.	NL-686S	440	1780
1	300	G.E.	KT-559A	2200	1775
1	300	Whse.	CS-1002	2300	580
1	250	Whse.	CS-875S	2200	1775
2	200	Whse.	CS-855S	220/440	1750

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Recession Boosts New York Sales

Used machinery dealers in New York report greater interest in late model machinery.

They say the recession has caused many companies to buy used machinery rather than invest in new equipment.

▪ The easy pace being set by the general economy is actually helping the business of used machinery dealers in New York.

This is the opinion of several dealers there. Here's how one sees it:

"When business is booming and they have plenty of money, machinery buyers want the latest, most streamlined equipment. But when business becomes a question mark—not really bad, mind you—they start counting their pennies. Then they are satisfied with good, late-model used tools."

Whether this appraisal is the reason or not, the fact remains that used machinery business is clearly better so far this year than in 1960. Some dealers trace the start of the improvement to December. Others go back to the third quarter of last year.

Mixed Appraisals — Dealer appraisals of other factors that might influence the market are mixed. Some dealers say, for instance, that the ambitious defense spending expected under the new Administration definitely helps change the buying atmosphere. But many say a majority of their recent sales are to companies not engaged in defense work.

A number of dealers report "overtures" from sources that would ship the equipment to Europe or South America. But very few dealers have consummated sales. And few expect this to be much of a factor in the market, at least in the next few months.

A major stumbling-block seems to be the difficulty exporters have in arranging financing.

Continued Activity—Most dealers expect this business improvement to continue through at least the next few months. Rate of inquiries, which traditionally is directly related to future sales, has been improving.

And there is apparently a good selection of late model tools of all kinds around. Few dealers report lost sales because they don't have or can't get what the customer wants.

Most used machine men are happy about the current price picture. They say prices of used tools are high enough to keep profit margins satisfactory. And they are low enough to bring in the business.

One dealer believes that if prices move in either direction business improvement may peter out.

Big Factors—Two of the factors that have convinced used tool sellers that the business improvement will continue: (1) Demand has improved just about across the board with no particular type of equipment much stronger or weaker than the market as a whole. (2) The general sales and inquiry atmosphere has improved in recent months.

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"We can now process orders with much greater speed," he continues, "yet we can reduce our inventory in the annealing department, because—by opening the coil—hot gases can saturate the entire coil in a fraction of the time previously required. Cool-down is just as efficient.

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Donald W. Frease, President of Empire-Reeves Steel Corporation (center), tells J. L. Whitten, Vice President of Sales of Lee Wilson (right), and E. G. Fenton of Empire, the results of Open Coil Annealing at Empire after the first few months of operation.

Lee Wilson
OPEN COIL PROCESS

Overall view of the Lee Wilson Open Coil Annealing installation at Empire-Reeves' Mansfield, Ohio, plant.

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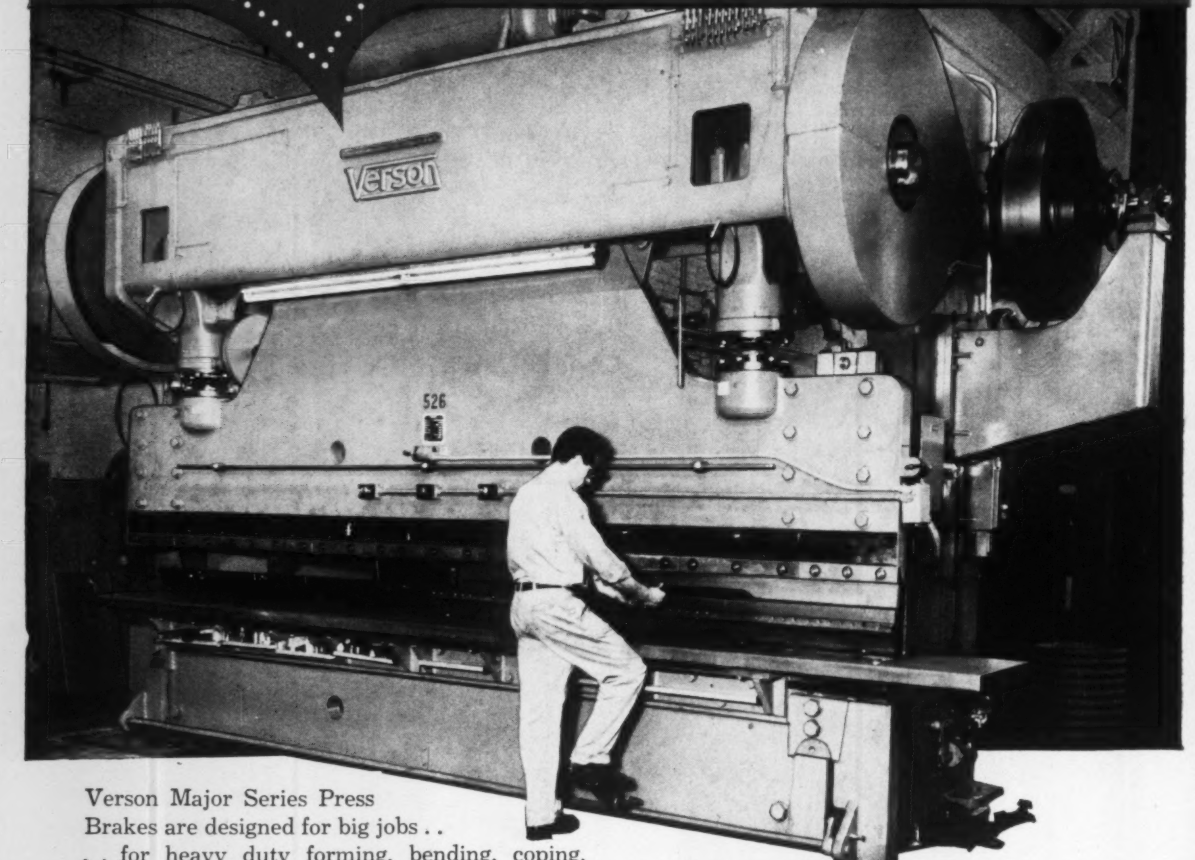

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